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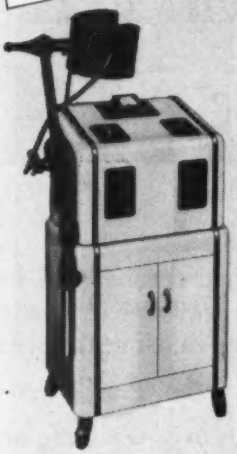

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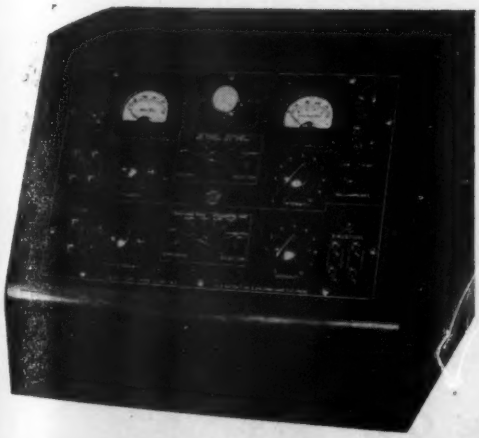

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PHYSICAL MEDICINE FACING FORWARD *

WALTER S. McCLELLAN, M.D.

Medical Director, The Saratoga Spa;

Associate Professor of Medicine, Albany Medical College

SARATOGA SPRINGS, N. Y.

Introduction

The presentation of a Presidential Address places a responsibility on the speaker which is emphasized by the splendid orations which have been given by my predecessors before this organization during the past years. They have considered the background of physical medicine, its specific developments, its responsibilities during the war, and, from time to time, its future development. In reading these addresses, it is clear that many of the recommendations and suggestions for its development have already been culminated. It is not my purpose to review again for you the splendid accomplishments of this Congress during the past quarter of a century. Our genial Secretary, Dr. Kovacs, has recently presented a review of physical medicine during this period covering the development and application of apparatus and technics, undergraduate and graduate instruction, and the importance of research, both basic and clinical.[1] The accomplishments of this important period have resulted from the careful and thoughtful individual efforts of the men and women who have worked so loyally in building the Congress of Physical Medicine into its present strong position.

In looking ahead, which is the keynote of planning in the postwar world, we can face forward with the realization that the terrible destruction of the past five years is now over, we hope forever. It has left its marks both on the individual and on the group. It has resulted in the disruption of many peoples and the destruction of great amounts of property. The program of rehabilitation which has been developed in this country will bear fruit in restoring to a life of usefulness and happiness many of those who have been injured both physically and mentally in the course of their service in the armed forces, as well as in providing a rounded program for many who have suffered similar injuries in civilian occupations.

Physical Forces in Life

May we think for a few minutes about the place of physical forces in the growth and development of the individual? Schrödinger, in his little book entitled "What is Life," [2] has brought to our attention some of the physical aspects of the living cell. Each of us is made up of many millions of such living cells, which are the building stones of our body, the basis for the expression of our personality and our will. Stressed in this book and emphasized in the review of Maren,[3] in the Book Section of the *New York Times*, is the impact of physics and mathematics on biologic research. To quote from Maren: "We see here the concept of the living cell being explained, if anything more particularly on the basis of physical forces than on the basis of chemistry." Biology and medicine today are making extensive stud-

* Presidential Address, Twenty-fourth Annual Session of the American Congress of Physical Medicine, New York, Sept. 4, 1946.

From the Medical Department of The Saratoga Spa, Saratoga Springs, N. Y.

1. Kovacs, R.: Progress in Physical Medicine During the Past Twenty-five Years, N. Y. State J. Med. 46:1229 (June 1) 1946.

2. Schrödinger, E.: What is Life, New York, The Macmillan Company, 1945.

3. Maren, T. H.: Some Physical Aspects of the Living Cell, New York *Times* Book Rev., May 19, 1946.

ies of these physical forces which, although known for years, have been brought to the attention of the world in the manifestation of their terrible destructive power during the past two years. Forces as powerful as those which are responsible for the atomic bomb play their part in the everyday life of the individual through their proper integration in the life of each of the living cells of our body.

Spa Therapy

To illustrate this application amy I turn to spa therapy? Some of the influences of natural mineral waters when used either internally or externally are due to their cumulative effect on the individual cells of the body. These natural agents are formed deep in the earth and are subjected to many influences, such as pressure and radioactivity. A mineral water is a complex physical chemical solution. These waters may produce changes in electrical conductivity in catalytic enzyme systems and affect the interchange of materials through cell walls. The cumulative summation of these effects on the individual cells can explain the result noted in the individual as a whole when he resorts to the spa for a period of treatment. The gases dissolved in the waters penetrate the skin during a bath in the gas-containing mineral waters. The principal gases found in mineral waters are carbon dioxide, hydrogen sulfide and radon. Experimental studies in our laboratories have demonstrated this absorption of carbon dioxide[4] and radon.[5]

Spas and health resorts have been criticized particularly because of overenthusiastic claims for the value of their treatment in certain diseases, and thoughtful physicians have refused to recognize any specific value of mineral waters. The principal gases found in mineral waters are carbon dioxide, metabolism produced largely by physical influences and represent a more normal functioning of the body as a whole. This recognizes the importance of the host in relation to disease processes, and, as the body functions more normally, it can delay or possibly prevent the development of invading disease.

Individual Initiative

Schrödinger[3] says that a piece of matter is alive when it goes on "doing something," moving and exchanging material with its environment. A living organism eats, drinks, breathes and assimilates. This concept brings to mind again the great importance of the individual cell, which may exhibit an abnormal reaction such as occurs in various diseases, as well as the part the whole individual plays in the developing of human life. We may feel that each one of us as members of this Congress or as individuals in the corporate society of our country may have little value in the over-all picture of life, but only as each individual plays his part to the best of his individual ability in exchanging material with his environment can we look forward to progress and development. Honesty, integrity and sound thinking are all characteristics of the leader who reaches out into the unknown and plots the course for the mass to follow.

Future Development

Future development in medicine will depend on the intelligent application of physical forces in the diagnosis and treatment of disease. The progress which physical medicine will make in the next years will depend on individuals. These individuals, of course, may be greatly aided by support, relief from financial obligations, opportunity for study and other factors which

4. McClellan, W. S.; Lessler, M. A. and Doulin, Alice T.: Physiologic Effects of Carbon Dioxide Water Baths on Alveolar Carbon Dioxide Tension, Skin Temperature, and Respiratory Metabolism, Am. Heart J. 29:44 (Jan.) 1945.
5. McClellan, W. S., and Comstock, C. R., Jr.: unpublished data:

may be contributed through the philanthropic foundations now organized for the development of this field in the United States.

The use of funds for research in physical medicine can develop institutes, physical plants and machinery, but the distance to which we reach out is dependent primarily on individual initiative. It is depressing to see in a beautiful building adequate laboratory space without sufficient workers to make an institute which will produce results. The training program for physiatrists will, I am sure, in the next decade, give us a group of strong individuals, thoroughly trained in the indications and limitations of physical medicine, who will be charting the course, who will be reviewing the ways and means by which physical agents affect the body and who will be developing new applications for the physical energies which will be placed in their hands.

Program of Training

The graduate educational program of physical medicine must extend to all physicians. It is necessary that internists, surgeons, psychiatrists and, in fact, all who practice medicine have a better understanding and a greater appreciation of the value of physical medicine. Ignorant of their value, they fail to use these potent therapeutic measures which could bring relief to many of their patients.

It is, I believe, the reponsibility of this Congress to foster and promote the training of physiatrists as specialists and to extend its postgraduate program to bring reliable information in this field to all physicians. Its efforts in the past always have been toward the growth of sound programs of treatment and the avoidance of the spectacular, the dramatic, and the practice of quackery and other forms of charlatanism. It will be my goal in the coming year as your President to foster the development of sound ideas and to stress the importance of individual integrity, because only in this way do I consider that true progress will be made.

$D=rt$

May we turn to the field of mathematics and recall the simple formula which we all learned, that the distance through which an object moves is equal to the product of its rate and of the time that it is moving? In other words, $D = rt$. It is obvious, I am sure, to everyone of us that the distance which is covered in research and development in the field of physical medicine is dependent, first, on the rate at which development occurs and, second, the time period during which it operates. It is my belief that one cannot expect to shackle developmental thought into any such straightjacket as may be demanded in setting a definite time for accomplishing the results. It is true that under the tremendous stress of war demands progress has been at a much more rapid rate than before. However, the development and the application of physical principles must also take sufficient time for careful deliberation and for repeated checking before we can calculate the distance which has been covered toward the goal of success.

Physical forces have been active in our world since the beginning. In our own field the use of sunlight, heat and water has been a part of life as long as it has been existent on this planet. We only have to look back to the story of Noah and the Ark to realize that the progress of the Ark was dependent on the buoyancy of the water which covered the earth and its forward progress on the winds resulting from physical forces. The Ark carried with it life as it was gathered from the earth before the flood, and when it was settled on the mountain, life went forth and the earth was inhabited again.

Today our world is faced with many problems and it would appear that an attempt is being made to hitch together fifty-one different pairs of animals in the United Nations and ask them to draw our world forward. There are, of course, difficulties in obtaining progress by hooking together animals of different species, strength and temperament. It is necessary, therefore, that our leaders recognize the forces which are inherent in life and permit them to develop according to the laws of nature which are essentially the application of physical forces.

In our own field it is necessary for students of medicine, for those who practice the arts and those who teach the principles, to realize that it is only as we are able to take the talent of each of these individuals with their different strengths, their different developments and their different temperaments and weld them into a team that progress will occur.

Conclusion

I have not attempted to stress tonight the programs which are in operation or to comment specifically on the details of any one program, but, in concluding this presentation, I can only bring to your attention a thought which I believe is important in peace as well as in war. It is taken from the writings of Ehrmann and quoted in a recent Bulletin of the American Association for the Advancement of Science.[6]

> Go quietly amid the noise and the haste and remember what peace there may be in silence. As far as possible, be on good terms with all persons. Speak your truth quietly and clearly and listen to others; they, too, have a story. . . . Keep interested in your own career, however humble; it is a real possession in the changing fortunes of time.

If the members of this Congress have the opportunity to enjoy a silent period when we may consider the large problems we face, and if we can have that confidence in our own careers when we may be discouraged over their seemingly little accomplishment, I believe that the future of this Congress is assured.

I thank you.

6. From the Netherlands East Indies, American Association for the Advancement of Science Bulletin, No. 4, Oct., 1945, p. 76.

EFFECT OF ELEVATED BODY TEMPERATURE ON THE PLASMA ASCORBIC ACID

ROBERT M. CRAIG, M.D.*

GEORGE X. SCHWEMLEIN, M.D.*

H. WORLEY KENDELL, M.D.**

CHESTER J. FARMER, MD.†

and

HANS C. S. ARON, M.D.††

The influence of artificially induced fever on the ascorbic acid in the blood of human subjects has been studied, but the results reported are not uniform. Osborne and Farmer,[1] as well as Zoak and Sharples,[2] found no significant changes of the plasma ascorbic acid after the body temperature of their patients had been elevated by physically induced fever. On the other hand, Daum, Boyd and Paul[3] observed regularly a definite decrease of the plasma ascorbic acid after twenty-seven courses of electrically induced fever given to 7 patients. Similar are the results of Falke,[4] who producd elevation of the body temperature by the use of Pyrifer in 15 patients. Both the last mentioned authors,[4] who reported a decrease of the plasma ascorbic acid after fever, had given their patients supplements of ascorbic acid of from 300 to 700 mg. per day orally, before and during artificial fever therapy.

If elevation of the body temperature should cause a decrease of the plasma ascorbic acid and an increased demand for this vitamin, this factor would indicate that the ascorbic acid balance should be maintained in patients undergoing any type of artificial fever therapy. This precaution would be especially important in fever therapy, when combined with the administration of chemotherapeutic drugs known to affect the ascorbic acid metabolism, as has been reported for some arsenicals,[5] and sulfonamides.[6]

The purpose of this investigation was to determine to what extent the plasma ascorbic acid level was influenced by various procedures of physically induced fever in combination with chemotherapeutic drugs applied for the treatment of syphilis and gonorrhea at the Chicago Intensive Treatment Center.

The results of these studies should determine if supplementation with ascorbic acid (vitamin C) is to be recommended as an adjunct in fever chemotherapy.

Determinations of the plasma ascorbic acid were performed according to

---

Under the direction of Herman N. Bundesen, Senior Surgeon (R) U.S.P.H.S. (Inactive), President, Chicago Board of Health.

From the Chicago Intensive Treatment Center, Venereal Disease Control Program, Chicago Board of Health in cooperation with the United States Public Health Service and the Department of Chemistry, Northwestern University Medical School.

* Senior Assistant Surgeon (R) U.S.P.H.S.

** Surgeon (R) U.S.P.H.S.

† Professor of Chemistry, Northwestern University Medical School.

†† Consultant, Chicago Health Department.

1. Osborne, S. L., and Farmer, C. J.: Influence of Hyperpyrexia on Ascorbic Acid Concentration in the Blood, Proc. Soc. Exp. Biol. & Med. **40**:575, 1942.
2. Zoak, J., and Sharpless, G. R.: Vitamin C. Nutrition in Artificial Fever, Proc. Soc. Exp. Biol. & Med. **39**:233, 1938.
3. Daum, K.; Boyd, K., and Paul, W. D.: Influence of Fever Therapy on Blood Levels and Urinary Excretion of Ascorbic Acid, Proc. Soc. Exp. Biol. & Med. **40**:129, 1939.
4. Falke: Ueber die Groesse des Vitamin C. Verbrauches im Fieber, Klin. Wchnschr. **18**:818, 1939. Daum, Boyd and Paul.3
5. Farmer, C. J.; Abt, A. F., and Aron, H. C. S.: Influence of Arsenicals, Bismuth and Iron on the Plasma Ascorbic Acid Level, Proc. Soc. Exp. Biol. & Med. **44**:495, 1940. Bundesen, H. N.; Aron, H. C. S.; Greenebaum, R. S.; Farmer, C. J., and Abt, A. F.: The Detoxifying Action of Vitamin C (Ascorbic Acid) in Arsenical Therapy, J. A. M. A. **117**:1692, 1941.
6. Holmes, H. N.: The Effect of Sulfa Drugs on the Excretion of Vitamin C. South Med. & Surg. **105**:393, 1943. Martin, G. J.; Fisher, C. F., and Thompson, M. R.: Therapeutic and Prophylactic Detoxication of Sulfanilamide, Sulfapyridine and Sulfathiazole, Arch. Int. Med. **69**:662, 1942.

the Farmer-Abt[7] method in venous blood drawn from patients in the fasting state on admission, immediately before fever chemotherapy, and from a series of patients during and always after fever chemotherapy.

The influence of four different types of fever chemotherapy on the plasma ascorbic acid was studied in 71 courses given to a total of 58 patients (table 1). The great majority of these patients had extremely low plasma ascorbic

TABLE 1. — *Types of Fever-Chemotherapy and Number of Patients Studied.*

Group	—Total Number— Patients	Courses of Fever	—Fever Maintained— at ° F. (Rectal)	for Hours	Chemotherapy — Before Fever	Chemotherapy — During Fever	Ascorbic Acid Supplements
I	9	22	105.0	3	None	1 dose 60 mg. mapharsen I.V.	None
II	9	9	105.5	8	150 mg. bismuth subsalicylate in oil I.M.	1.76 mg. mapharsen per Kg. body weight in 3 doses I.V.	None
III	11	11	106.0	8	8 Gm. sulfathiazole during 22 hours	None	None
IV	29	29	106.0	6	600,000 O.U. penicillin in 12 doses of 50,000 O.U. each I.M. every 2 hours.	600,000 O.U. penicillin in 6 doses of 100,000 each I.M.	300-2,400 mg. orally before fever
Total	58	71	.....	—			

acid values on admission. Almost half of them (47 per cent) had values of 0.1 mg. per hundred cubic centimeters or lower; 41 per cent were in the range of from 0.11 to 0.3 mg. and only 12 per cent of this group had, on admission, levels higher than 0.3 mg. The first half of the 58 patients studied, a total of 29, received the hospital diet for from three to five days preceding fever therapy and a glass of fruit juice in the morning before being placed in the fever cabinet. These dietetic measures assisted in raising the plasma ascorbic acid level to some extent, but the values still remained in low ranges:

Range of Plasma Ascorbic Acid Mg. Per 100 cc.	Per Cent of Patients On Admission	Before Fever
0.0 to 0.10	47	17
0.11 to 0.30	41	47
0.31 and higher	12	36

To bring the plasma ascorbic acid to higher levels, the second half of the 58 patients were given supplements of ascorbic acid in tablet form orally for from one to three days preceding fever. The following tabulation demonstrates that the effect on the plasma ascorbic acid was directly related to the amount of medication given per treatment.

	Extremely Low 0.0 to 0.1 Mg./ 100 cc.	Low 0.11 to 0.3 Mg./ 100 cc.	Satisfactory 0.31 Mg. or Higher/ 100 cc.	Total
Number of Patients:				
After oral dose of ascorbic acid.				
300 to 600 mg.	2	8	6	16
1200 to 2400 mg.	none	5	8	13
Per cent of Patients:				
After oral dose of ascorbic acid.				
300 to 600 mg.	12%	50%	38%	100%
1200 to 2400 mg.	0%	38%	62%	100%

7. Farmer, C. J., and Abt, A. F.: Determination of Reduced Ascorbic Acid in Small Amounts of Blood, Proc. Soc. Exp. Biol. & Med. 34:146, 1936.

The results of the studies are summarized in tables 2 to 5, separately for each of the four groups of patients. The upper section of each table gives the medians, the maximum and minimum and the number of values at the various times that ascorbic acid determinations were made. The bottom section gives the medians of the changes in the plasma ascorbic acid level during and after fever, calculated for each individual patient. The method used was the same as that applied previously in the studies on vitamin A and carotent.[8] The prefever ascorbic acid plasma value of each individual patient was regarded as the base line and was made equal to 100. All following values obtained for the same patient are expressed in per cent of the prefever value of 100.

Tables 2 to 4 show the results obtained for the first three groups of patients who received no supplements of ascorbic acid tablets before fever chemotherapy. As was discussed previously, the plasma ascorbic acid levels

TABLE 2. — *Influence of Three Hours of Fever at 105.5 F. (Rectal) With 60 Mg. Mapharsen I.V. on the Plasma Ascorbic Acid: 9 Patients: 2 or 3 Courses Each: Total 22 Courses.*

	Plasma Ascorbic Acid in Mg. Per Hundred Cubic Centimeters		
		After Fever	
All Patients	Before Fever	1st A. M.	2nd A. M.
Medians	0.17	0.12	0.15
Min. and Max.	0.05 to 0.56	0.05 to 0.61	0.06 to 0.56
No. of Values	22	21	22
	Plasma Ascorbic Acid in Per Cent of Prefever Level = 100		
		After Fever	
Individual Patients	Before Fever	1st A. M.	2nd A. M.
Medians	100	100	100
Min. and Max.	100-100	45.5-135.3	35.3-135.3
No. of Values	22	21	22

TABLE 3. — *Influence of Eight Hours of Fever at 105.5 F. (Rectal) After Bismuth With Mapharsen Intravenously on the Plasma Ascorbic Acid of Nine Patients.*

	Plasma Ascorbic Acid in Mg. Per Hundred Cubic Centimeters			
		After Fever		
All Patients	Before Fever	1st A. M.	2nd A. M.	3rd A. M.
Medians	0.28	0.24		0.30
Min. and Max.	0.12 to 0.62	0.12 to 0.36		0.18 to 0.36
No. of Values	9	9		9
	Plasma Ascorbic Acid in Per Cent of Prefever Values = 100			
		After Fever		
Individual Patients	Before Fever	1st A. M.	2nd A. M.	3rd A. M.
Medians	100	81		90.9
Min. and Max.	100-100	58.5-133.3		58.5-150
No. of Values	9	9		9

of these patients were in low ranges. Greater changes in the plasma ascorbic acid level appears in the lower ranges. Thus a rise or drop of 0.05 Mg.

8. Aron, H. C. S.; Craig, R. M.; Farmer, C. J.; Kendell, H. W., and Schwemlein, G. X.: The Effect of Elevated Body Temperature on Plasma Vitamin A and Carotene, Proc. Soc. Exp. Biol. & Med. 61:271, 1946.

Per hundred cubic centimeters amounts to a change of 50 per cent when the plasma level is 0.1 mg. per hundred cubic centimeters, but the same rise or drop amounts to but 10 per cent when the plasma level is 0.5 mg. When this fact is kept in mind, it certainly cannot be regarded as a significant change when after eight hours of fever chemotherapy the ascorbic acid plasma median values vary 15 to 19 per cent from the prefever level. It is justifiable to

TABLE 4. — *Influence of Eight Hours Fever at 106.0 F. (Rectal) After Sulfonamides on the Plasma Ascorbic Acid of Eleven Patients.*

	Plasma Ascorbic Acid in Mg. Per Hundred Cubic Centimeters			
		After Fever		
All Patients	Before Fever	1st A. M.	2nd A. M.	3rd A. M.
Medians	0.13	0.12	0.15	0.12
Min. and Max.	0.09 to 0.48	0.06 to 0.27	0.09 to 0.24	0.06 to 0.27
No. of Values	11	11	4	7
	Plasma Ascorbic Acid in Per Cent of Prefever Values = 100			
		After Fever		
Individual Patients	Before Fever	1st A. M.	2nd A. M.	3rd A. M.
Medians	100	75	94.5	100.0
Min. and Max.	100-100	50-150.0	75.0-175.0	44.0-150
No. of Values	11	11	4	7

conclude that no significant changes in the plasma ascorbic acid level were found on the first, second, or third morning after the patient's body temperature had been elevated to 105 or 106.0 F. (rectal) for three or eight hours.

The results for the group of 29 patients who were given from 300 to 2,400 mg. of ascorbic acid orally during the prefever period are compiled in table 5. Chemotherapy of these patients consisted of 600,000 Oxford units of sodium penicillin, given in twelve doses intramuscularly every two hours

TABLE 5. — *Influence of Six Hours of Fever at 106.0 F. (Rectal) With Penicillin on the Plasma Ascorbic Acid of Twenty-Nine Patients After Oral Ascorbic Acid Medication Preceding Fever.*

	Plasma Ascorbic Acid in Mg. Per Hundred Cubic Centimeters			
		After Fever		
All Patients	Before Fever	3 Hr.	6 Hr.	1st A. M.
Medians	0.30	0.32	0.28	0.29
Minimum	0.09	0.06	0.06	0.06
Maximum	1.33	1.39	1.35	1.29
Number of Values	29	29	28	28
	Plasma Ascorbic Acid in Per Cent of Prefever Values = 100			
		After Fever		
Individual Patients	Before Fever	3 Hr.	6 Hr.	1st A. M.
Medians	100	100	100	82.5
Minimum	100	66.7	62.5	50.0
Maximum	100	147.4	147.4	157.9
Number of Values	29	29	28	28

during the day of preceding fever, and 600,000 units intramuscularly in six doses every hour during fever. The medians of the plasma ascorbic acid levels remained at the 100 per cent prefever levels after the patient's body temperature had been elevated to 106.0 F. (rectal) for three and for six hours. On the first morning after treatment the median was 82.5 per cent of the prefever value — not a significant decline. Considering that all changes in the plasma ascorbic acid level in this group of patients again are very small, it is justifiable to conclude that elevation of the body temperature to 106.0 F.

(rectal) for six hours has no significant effect on the plasma ascorbic acid level, even when the plasma levels are brought up by oral medication of ascorbic acid shortly before fever therapy is started. The intramuscular and intravenous administration of the sodium salt of penicilin, in combination with the elevation of the body temperature, has no significant effect on the plasma ascorbic level.

Summary

No significant changes in the plasma ascorbic acid level were observed when the body temperature of 58 patients had been elevated to 105.0, 105.5 and 106.0 F. (rectal) for three, six or eight hours by means of physically induced fever. Seventy-one courses of fever were given in combination with chemotherapeutic agents, such as oxophenarsine hydrochloride (marpharsen), penicillin, sulfonamides or bismuth subsalicylate, before or during fever therapy. The majority of the patients had plasma ascorbic acid levels of less than 0.3 mg. per hundred cubic centimeters on admission; therefore half of the 58 patients treated were given oral supplements of ascorbic acid of from 300 to 2,400 mg. for one to three days preceding fever. The elevated plasma ascorbic acid levels produced by this medication were fairly well maintained during and after the patient's body temperature had been elevated to 106.0 F. (rectal) for six hours.

HEAVY RESISTANCE EXERCISES

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Exercise therapy is essential in restoring maximum function following many types of diseases and injuries. For therapeutic purposes exercises may be classified according to the quality developed in the exercised muscle — namely power, endurance, speed and coordination. A thorough understanding of these types of exercises and the results produced by each is essential before exercise can be employed successfully as a therapeutic agent.

Many poor results are due to a failure to discriminate between the types of exercises; thereby the wrong type of exercise is used to produce the desired results. However, it would be difficult to exercise for one quality and not to some extent develop qualities characteristic of other types of exercises. For example, when one is using exclusively power exercises some improvement in coordination and endurance is obtained. Likewise, endurance exercises build some power, and so on. However, the type of exercise used produces a predominance of the quality of which it is characteristic.

Preliminary Considerations

Most injuries of the trunk and extremities result in atrophy of varying degree. When the local injury has healed, redevelopment of muscle power is the most important factor in restoring normal function to the extremity. The method here presented for developing muscle power by exercise is founded on the principle of heavy resistance and low repetition exercises, whereas the generally accepted principle is low resistance and high repetition exercises —such as stationary bicycle riding, lifting light standbags or other weights

through ropes and pulleys and stair climbing — which develop endurance rather than power. The fatigue that results from the latter is due not so much to overcoming resistance as to the sheer number of repetitions; therefore, such exercise does not develop power. If low resistance is used for a low number of repetitions, no significant increase in either power or endurance results, and the only value lies in the increase of joint motion. On the other hand, in my method heavy resistance that calls forth all the potential strength of the muscle is employed. Since the rate and extent of muscle hypertrophy are usually proportional to the resistance the muscle must overcome, strength returns faster than in the low resistance exercises. I believe this to be true because I have seen many patients fail to obtain any appreciable quadriceps hypertrophy during several months of low resistance exercises, whereas, with the heavy resistance exercises, rapid hypertrophy (in several instances 2 to 2½ inches of hypertrophy of the thigh muscles within six to eight weeks) have uniformly been recorded. Power is developed in the affected limb until it equals that in the normal. When the strengths of the limbs are approximately equal, then endurance exercises may be begun. Rather than to attempt to develop endurance in an atrophied, weakened muscle, it seems more logical to restore muscle strength to normal and then to build endurance by means of low resistance, high repetition exercises.

The quadriceps exercise described is particularly valuable, for it develops maximum power without weight bearing.[1] Since it is a non-weight bearing exercise, it is especially useful in redeveloping the musculature following meniscectomy and in unstable knees. In these two conditions, particularly when there is quadriceps atrophy, weight-bearing exercises (such as bicycling, stair climbing and similar ones), frequently cause swelling and fluid. Except in rare instances, I have seen neither swelling nor fluid on maximum exertion with these non-weight-bearing exercises. In most of my cases, these symptoms have actually completely subsided on exercise. After these patients have succeeded in restoring normal power to their injured limbs, they are able to do the light weight-bearing exercises mentioned without the development of either symptom.

This paper deals with the redevelopment of muscle power, chiefly in the quadriceps, although some consideration will be given to other muscles.

Program of Exercises

In this program of heavy resistance exercises, the patient exerts his maximum power only once a week. The maximum quadriceps power for clinical purposes is taken to be the maximum poundage that can be raised to the point of complete extension of the leg for one repetition. It is recorded in pounds. Once each week the patient exerts the maximum effort of which he is capable for one repetition. On the other days no weight heavier than that which is maximum for ten repetitions is used. This program of periodic maximum muscular exertion is used even for the most atrophied muscles. Contrary to the popular belief that after injury the quadriceps should never be exercised to its limits, this method has never produced chronic muscle sprains or failed to achieve return of muscle power.[2] On the basis of clinical observations in 300 cases in which this program of exercises was used, I firmly believe that even extremely atrophied muscles should exert their maximum effort at regular intervals.

Description of Exercise. — The patient is seated on the table with his knees

1. Watson-Jones, R.: Fracture and Joint Injuries, Baltimore, Williams & Wilkins Company, ed. 3, p. 702, 1943.
2. Nicoll, E. A.: Principles of Exercise Therapy, Brit. M. J. 1:747 (June 19) 1943.

flexed at an angle of 90 degrees, and the boot is strapped on the foot. A folded blanket or pad is placed under the knees. The patient is now in the starting position, as illustrated in figure 1. The leg is extended as completely as the disability will permit. The leg should be extended and lowered at the same rate. The movements are done smoothly, rhythmically and without haste but not so slowly that the mere holding of the weights will tire the patient. Quick or sudden motions while exercising are to be avoided. A momentary pause at the end of each repetition is advocated.

The importance of complete extension with each repetition cannot be overemphasized. The vastus medialis functions chiefly by carrying the leg through the last 15 degrees of extension. The disproportionately rapid atrophy of this muscle following injuries of the lower extremity and prolonged immobilization with resultant inability to extend the leg completely is a familiar clinical picture. Restoration of strength to the vastus medialis

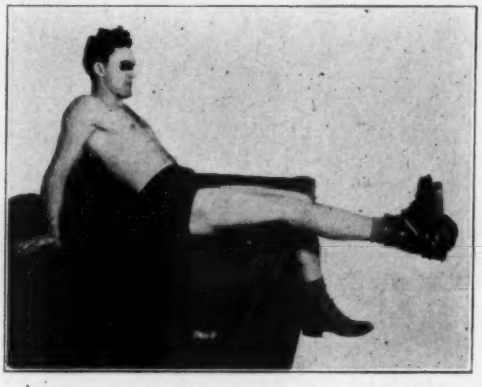


Fig. 1. — Quadriceps exercise, using one boot

is a major problem to orthopedists and physical therapists. If there is sufficient strength present to carry the leg either partially or completely through the last 15 degrees, the problem is not too great. However, if there is complete inability to extend the leg through the last 15 degrees, the problem calls for more strenuous measures. In these cases it would be impossible to redevelop vastus medialis power if the only function of this muscle were extension in the terminal 15 degrees, but the muscle also functions through a much larger range of motion when the leg must overcome a very heavy load. This fact makes it possible to exercise the vastus medialis actively in the available range of extension, thereby building power that will eventually make it possible to extend the knee completely. Sufficient vastus medialis power to produce complete extension can be built by using heavy resistance through the available range of motion. The patient should be taught to expend an extra effort on each repetition at the point at which he has reached his maximum extension to attain even more extension.

At the beginning of the exercise and until the limbs are approximately equal in strength, only the affected extremity is exercised. Only one boot and a short bar are used, as shown in figure 1. When the limbs are approximately equal in strength, they are exercised simultaneously, two boots attached to a long bar being used, as shown in figure 2. It is advisable for the patient to use two boots for a while to increase strength in the unaffected extremity, since this extremity becomes considerably weakened from disuse. When both boots are used, the principles of exercise, poundage increase, repetitions, et cetera, remain the same as when one boot is used.

Apparatus. — Resistance is offered by iron plates, graded from 1¼ to 25 pounds each. These plates are attached to an iron boot by means of a short

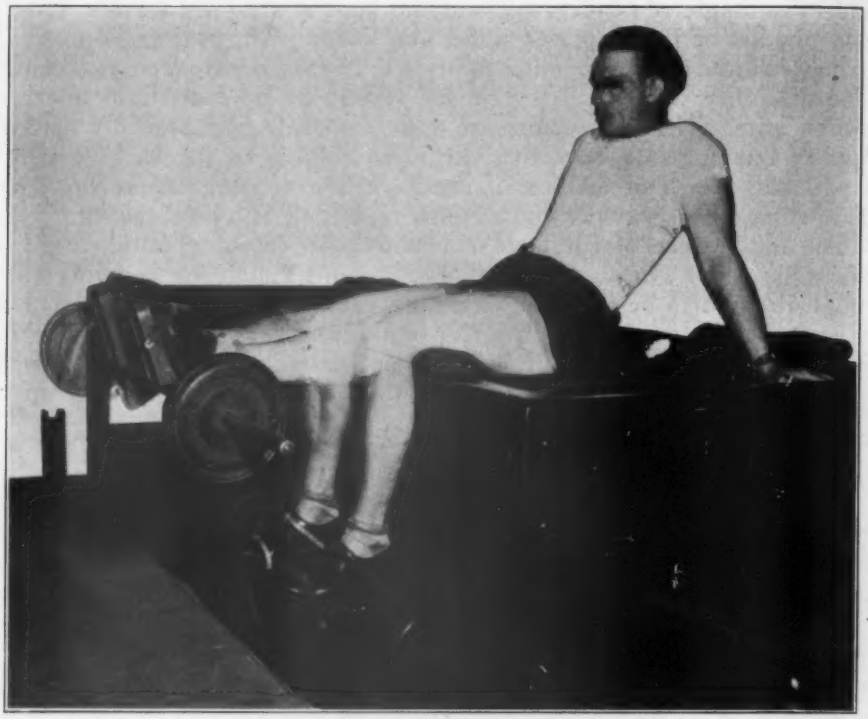


Fig. 2. — Quadriceps exercise using two boots

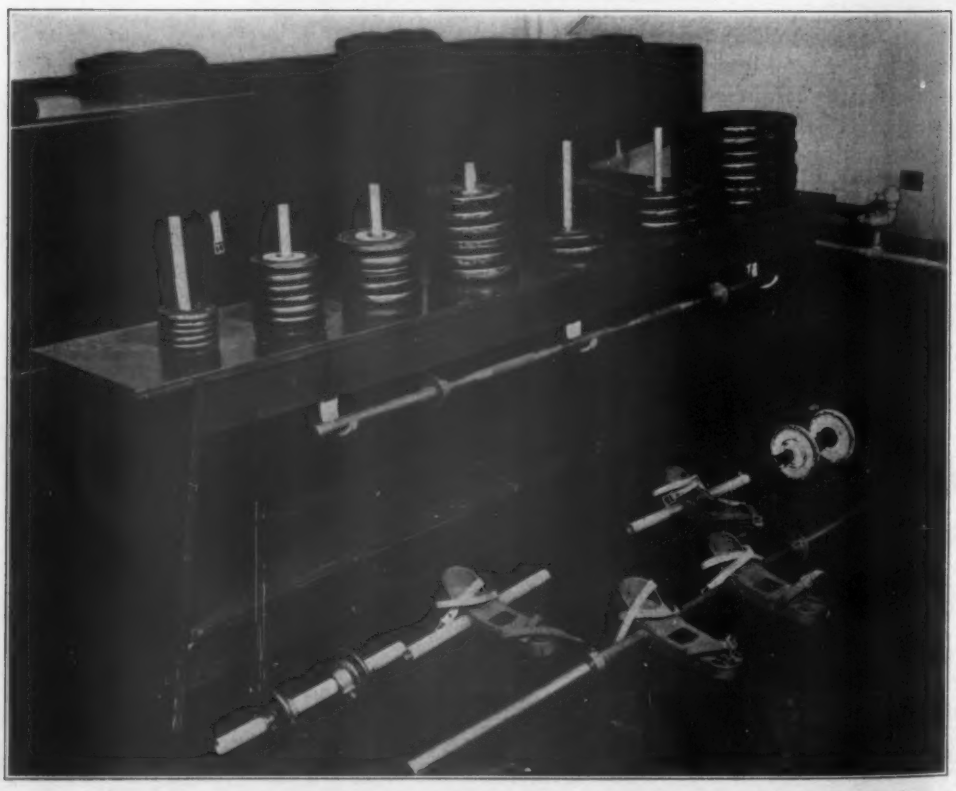


Fig. 3. — Boot for leg exercises (courtesy *J. Bone & Joint Surg.*)

iron pipe which fits into the boot. This boot is made especially for leg exercises. The iron boots, plates and bars are shown in figure 3.

The exercises are performed on a table which should be 36 inches high and at least 50 inches wide. The legs and top of the table should be of heavy material and reinforced, since it will be subjected to considerable strain. The edge should be raised 2 to 3 inches, so that when the leg is completely extended the entire limb will be parallel to the floor. The quadriceps exercise table is shown in figure 4.

Fig. 4. — Quadriceps exercise table. The stands, *A*, are to support the weights between sets of exercises (courtesy *J. Bone & Joint Surg.*).

Repetitions and Weight. — Fifteen is the maximum number of repetitions ever performed in series, regardless of the amount of weight lifted. Ten or twelve is the number generally performed. The total number of repetitions for an average exercise period varies from seventy to one hundred—that is, seven to ten series of exercises with ten repetitions in each.

Ten Repetitions Maximum (10 R.M.) — The amount of weight lifted by the patient at any single extension during his first week of exercise is determined at the time of his initial workout, as follows: Starting with the weight of the boot (5 pounds) and increasing by small amounts (1¼ to 5 pounds), the patient lifts each weight in ten repetitions. That weight which requires maximum exertion to perform ten repetitions is thus determined. For the remainder of the week, no weight heavier than this ten repetition maximum (10 R.M.) is used. Once each week the patient makes an attempt to increase this 10 R.M., and when this amount is determined no heavier weight is used during the ensuing week. For example, a patient in his first workout finds that the heaviest weight with which he can perform ten repetitions is 20 pounds. Thus, during his first week, he uses nothing heavier than 20 pounds. At the end of the first week, the 10 R.M. is again determined and found to have increased to 30 pounds. Then 30 is the maximum poundage used during his second week of exercise, et cetera.

Since seventy to one hundred repetitions must be performed in each workout, and each poundage is used for ten repetitions, the workout must be begun with a weight considerably less than 10 R.M., so that when the 10 R.M. has been reached seventy to one hundred repetitions will have been performed. The example given can be continued to illustrate this point. The 10 R.M. for the first week was 20 pounds. By starting with 2½ pounds, plus the weight of the boot, and increasing 1½ pounds after each series of ten repetitions, eighty repetitions will have been performed when 20 pounds is reached.

One Repetition Maximum (1 R.M.). — As previously stated, once a week the patient exerts his maximum quadriceps power (maximum weight that can be lifted with one repetition, the knee going into complete extension). This one repetition maximum (1 R.M.) is determined on the same day as the 10 R.M., in the following manner: When the 10 R.M. has been determined, the increases in weight are continued. With each increase beyond the 10 R.M., fewer repetitions can be done, until finally that weight which can be extended only for one repetition with maximum exertion is reached. This is recorded weekly as the index of quadriceps power.

As strength returns to the muscle, the weight increases may be 5 to 10 pounds, rather than 1¼ to 2½ pounds; the total number of repetitions for a workout thus being kept within the range of seventy to one hundred.

Of course, there are many patients who, because of severe quadriceps weakness, have an initial 10 R.M. of less than 5 pounds. For them the procedure is altered: Two or three series of ten repetitions each without any weight are used, 1¼ pounds is added and then two or three series more are given. Then, by increases of 1¼ pounds, each patient's 10 R.M. is finally determined. (When the patient is unable to begin the exercises with the weight of the boot, 5 pounds, the smaller weights are attached to the foot by means of a leather strap.)

In cases in which there is incomplete extension due to muscle weakness, the program is further altered. After the patient has performed ten repetitions with the maximum poundage which can be extended to the same degree as when no resistance is being applied, he then continues to increase the poundage at the sacrifice of extension. The increase in poundage is continued until the knee can be extended only a few degrees. Exercise in this way through the available range of motion is necessary when muscles are extremely atrophied, in order to build enoufh power eventually to effect complete extension. This is especially true when the vastus medialis is weak.

Frequency and Length of Workout Periods. — The patient exercises once a day, five days a week, the workout period usually lasting one-half hour. He is encouraged to rest his leg as much as possible during the two days he does not report for the exercises. Since the exercise periods are short and come only once daily, the patient does not tire of the program, as is often the case when an exercise must be practiced hourly or several times a day.

Data Recorded. — The following measurements are recorded weekly:

1. Range of motion
   a. Extension
   b. Flexion
2. Thigh circumference
3. Power
   a. 1 R.M. (one repetition maximum)
   b. 10 R.M. (ten repetition maximum)

The weekly determination of the 1 R.M. and the 10 R.M. is made on the same day. For convenience, I designate Friday as the day on which the

quadriceps power is determined. There should be a two day rest following this day of maximum exertion, and this arrangement makes it unnecessary for the patient to exercise over the week end.

The thigh is measured once a week, at a constant level. Silver nitrate is used to mark the level, to make sure that every measurement is taken in the same place. Daily observations are made for development of fluid, swelling, pain, et cetera.

The maximum quadriceps power is determined and thigh measurements of the unaffected extremity are taken when the exercise program is initiated. Maximum results have been obtained when the two extremities are equal in power, circumference and range of motion.

Observations

Symptoms Developing as a Result of Exercises. — The only symptom that has developed as a result of exercise was soreness of the quadriceps muscle. This soreness invariably disappeared within a week. In no instance has swelling or fluid appeared in the knee joint secondary to the strenuous exercises.

Development of Power in the Existing Range of Motion. — Too often the main stress is placed on increasing motion in an atrophied, weakened limb with a limited range of motion, and very little or no thought is given to developing power. Nicoll has stated that "range without power is worse than useless, for in its extreme form we have a flail joint."[2] The return of power should accompany return of motion. It is more desirable to have normal power in the existing range of motion than to sacrifice development of power for a wider range of motion. The exercises which I advocate are planned so that return of power accompanies return of motion. I believe that range of motion increases more rapidly with increasing muscle power, except when a mechanical factor prevents return of motion.

Focal Exercises Versus Group Exercises. — I am convinced from observation of patients indulging in group exercises and games as performed in reconditioning programs that group exercises for focal muscle redevelopment are unsatisfactory because:

1. The mental factor governing muscle exertion is such an important one in attaining maximum results that the patient must concentrate completely, and actually watch (whenever possible) the muscle being exercised throughout each repetition. Group participation offers too many factors to divert the patient's attention.

2. If a patient is unable to perform the movements as well as other members of the group, he may feel his inadequacy to such an extent that he will attempt to cover his weakness by adopting compensatory trick movements, thus accomplishing the feat with muscles other than the one which he is attempting to redevelop.

3. It is much easier for a patient who must be prodded along, to conceal his half-hearted efforts in group exercises.

4. Since there are individual variations in strength, symptoms and types of injuries, it seems illogical to give exercises to groups of patients with the same repetitions, motions, resistance and tempo.

Endurance Versus Power. — It is my opinion that in the past one of the shortcomings of the conventional type of physical therapy for redeveloping musculature has been a failure to discriminate between endurance-building and power-building exercises, By "power-building" exercises are meant exercises in which heavy resistance is used for a low number of repetitions. "Endurance-building" exercises are those in which low resistance is used for a large number of repetitions. These are two entirely different types of

exercises, each producing its own results, and it has been my experience that each is incapable of producing the results obtained by the other. I feel that most current attempts to redevelop musculature are based on exercises which are, in the final analysis, endurance building and not power building in nature. Therefore it is wrong, for example, to put a patient with an extremity weakened by injury on such endurance-building exercises as stair climbing, walking, bicycling and similar low resistance exercises until the extremities are approximately equal in strength.

I have observed that a muscle exercised solely on power-building exercises will not have the quality of endurance, whereas a muscle subjected exclusively to endurance-building exercises will not have the quality of power. However, a powerful muscle can be given endurance-building exercises and attain the quality of endurance; likewise a muscle with great endurance can attain power through the power-building exercises. How illogical it would be for a track man to train for long-distance running events solely by doing knee bends with heavy weights on his shoulder or a professional weight-lifter to train for heavy lifts solely by running several miles a day.

It seems more logical to restore the weakened extremities to normal strength by power-building exercises and then to exercise for endurance. Endurance is a quality of normal muscle; therefore should not be sought after until the muscle has returned to normal. I believe it unlikely that endurance can be attained in a markedly atrophied muscle, for I have seen many patients who had been on low resistance, high repetition exercises for months who still complained of rapid tiring of the muscle.

Physiologic Aspects of the Heavy Resistance Exercises. — It is not the purpose of this paper to discuss neuromuscular or muscle physiology. It presents only the clinical observations made in 300 cases in which these exercises have been employed. The splendid response in muscle hypertrophy and power, together with symptomatic relief, seems to justify any possible violation of physiologic principles.

The question arises as to whether it is advisable to induce maximum loads on weakened and atrophied muscle fibers. I firmly believe, on the basis of my clinical observations, that even atrophied musculature must be submitted intermittently to maximum loads in order to obtain maximum hypertrophy. I have treated many patients with fractured femurs which had been immobilized from six to fourteen months. The thigh muscles were very hard on palpation, suggesting fibrosis, and lacked power. These responded in four to six weeks, showing an increase in thigh circumference of 1 to 2 inches and a remarkable increase in power. They were under maximum loads at regular intervals from the very beginning. It was interesting to observe how quickly these muscles softened and assumed the consistency of normal muscle. This observation throws an interesting light on hypertrophy and return of power in fibrotic muscle.

From clinical observation I believe that, in order to produce in muscle maximum hypertrophy, the heaviest load should be imposed on the muscle as it approaches complete contraction and not when it is stretched. It is an accepted physiologic principle that, up to a certain degree, the greater the initial stretch or tension on a muscle (length) the greater the contractile power of the muscle. Therefore, I have theorized that when the maximum load is imposed on a stretched muscle its fibers have the initial advantage rendered by the stretched state and fewer fibers can overcome the resistance than if the muscle were not stretched. When the muscle fiber is contracted, it does not have this advantage. In order to overcome the resistance, a greater number of fibers are called upon; more fibers are exercised and thus

stimulated to hypertrophy. Also, by increasing the load as the muscle reaches the contracted state, a higher degree of coordination of the contracting muscle fibers is obtained, increasing the contractile power of the muscle as a whole. Most of the power-building exercises here described are so arranged that resistance increases as the muscle contracts.

The use of a pulley system for quadriceps redevelopment has the disadvantage that the maximum resistance comes when the muscle is stretched. The pulley system as contrasted with the present method is demonstrated in figure 5*A, B, C, D.* I do not mean to imply that pulleys are of no value in giving heavy resistance exercises; on the contrary, they often afford the only means of exercising a certain muscle group. However, for redevelopmnt of such an important group as the quadriceps, it is felt that the pulley system is inadequate.

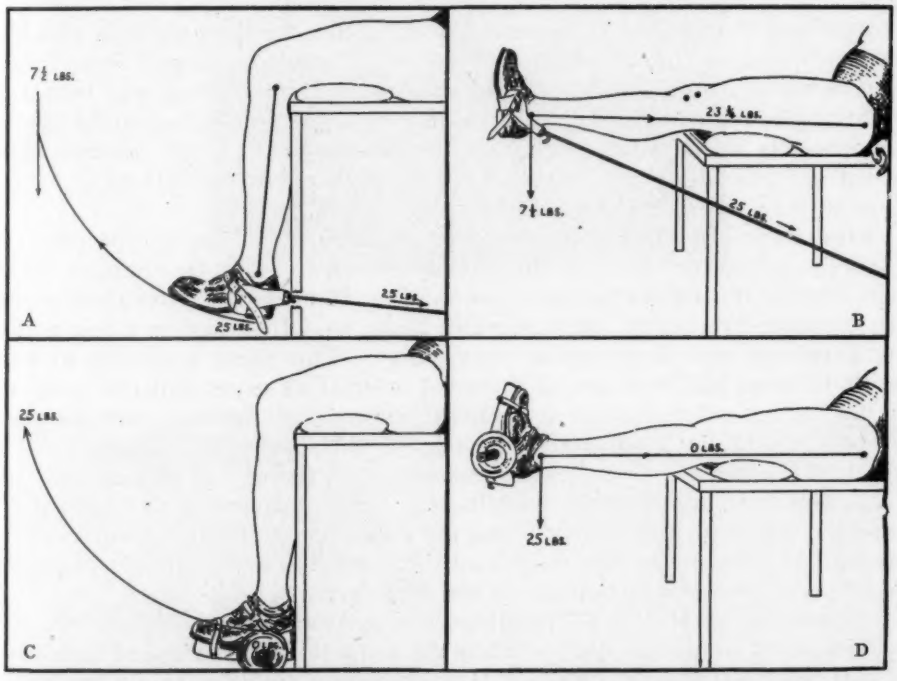


Fig. 5. — The pulley system with knee flexed in starting position is shown in *A*. There is 25 pounds of resistance on the pulley system, applied to the leg through the rope shown attached to the foot. The long axis of the leg in the starting position is perpendicular to the rope. At this point the resistance consists of the full 25 pounds. However, as the leg extends, the rope comes to lie at a more acute angle to the shaft of the leg, and the amount of resistance to be overcome has decreased to only 7¼ pounds. In full extension, 23¾ pounds of the initial 25 pounds of resistance are lost as a compression force in the direction indicated by the arrow, leaving as a resultant of forces only 7¼ pounds of resistance to be overcome by the quadriceps. Thus the pulley system is one of decreasing resistance as the leg goes into extension. Therefore, when that part of extension controlled by the vastus medialis is reached, the resistance has greatly decreased; hence this muscle is neglected in the strenuous phase of the exercise. When the resistance is added directly to the foot, the reverse of the above stiuation exists. In the starting position (*C*) the resistance is practically nil; but, as the leg extends, the resistance rapidly increases and is maximum (25 pounds) when the leg is completely extended (*D*). There is no compression force as is present in the pulley system. The vastus medialis receives the chief benefit from this exercise.

Maintenance of Hypertrophy and Power. — The progress of several patients has been followed for twenty-six months after the termination of this program of intensive exercise. Measurement at this time revealed no appreciable loss of muscle size or power, and there was no return of the symptoms previously noted—such as giving way of the knee or weakness of the extremity. The patient can best maintain the power gained by exercising once of twice a week for fifteen to thirty minutes at a time. It is comparatively easy to maintain the power, once it has been attained.

Types of Cases in Which Exercises Are Used:

1. Fractured femurs.
2. Unstable knees resulting from tears of the cruciate and collateral ligaments.
3. Knees following removal of the menisci—lateral, medial or both. The program has been used vigorously after total synovectomy of the knee, with good results.
4. Fractures of the patella.
5. Recurrent dislocation of the patella.
6. Fractures of tibia and fibula in cases in which prolonged immobilization has brought about quadriceps atrophy, as well as atrophy in other muscles of the extremity, and limited motion in the knee joint.
7. Knees following chrondrectomy for chondromalacia of the patella.
8. Muscle weakness and limitation of joint motion due to severe soft tissue wounds and scarring.
9. Removal of foreign bodies from the knee joint.
10. Knees after patellectomy.

Comment on Cases

Fractured Femurs. — The gain in circumference for those patients who had obtained flexion of the knee to approximately 90 degrees ranged from 1 to 2 inches in the first four to six weeks of exercise. When flexion was less than a right angle, the gains were not so rapid, since the quadriceps could not be so thoroughly exercised through this limited range. A few patients who worked exceptionally hard increased their thigh measurements by 2 to 2½ inches in from six to eight weeks.

Frequently after immobilization the muscles of the thigh, especially the quadriceps group, are hard in consistency because of fibrotic changes which have occurred during the period of inactivity. Immediately after these strenuous exercises are begun, these muscles begin to soften, and in a few weeks they have regained their normal consistency. This rapid softening of hard fibrotic muscles has been one of the most interesting aspects of this program and has further substantiated my belief that weakened, fibrotic, atrophic muscles should not be "pampered" because of their subnormal condition but should be exercised against heavy resistance. In the case of one patient who was immobilized for fourteen months, the thigh muscles of the injured leg showed atrophy of 2 inches and had the consistency of hard rubber. After two months of exercise, the thigh had increased 1½ inches in circumference and the consistency was that of normal muscle.

Restoration of Motion. — Attainment of a normal range of knee joint motion following immobilization incident to a fracture of the femur is often a difficult and perplexing problem. After prolonged immobilization, especially in case of fracture of the lower third (more especially fracture involving the femoral condyles), there is often a marked limitation of flexion. When some of these patients first begin physical therapy (consisting of heat, massage and exercises with mild forcing) they often rapidly regain flexion of about 30 to 50 degrees and then during weeks and months of a similar routine make no further progress. For such patients a leg-exercising apparatus (fig. 6) has been constructed.

Leg-Exercising Apparatus. — This machine was designed to allow the patient to exercise the leg against resistance in a position most conducive to the bending of the leg by such resistance. Because the patient himself is in complete control at all times of the amount of resistance and can remove and apply resistance as pain and fatigue dictate, he will allow the leg to flex more than if a physical therapist were applying the same amount of resistance by hand. The patient cannot control the pressure or movements of the operator and will not relax the antagonistic muscles sufficiently to permit the knee to bend to a point of discomfort. However, if he himself can apply the resistance, he will allow the knee to bend to the point of pain, without

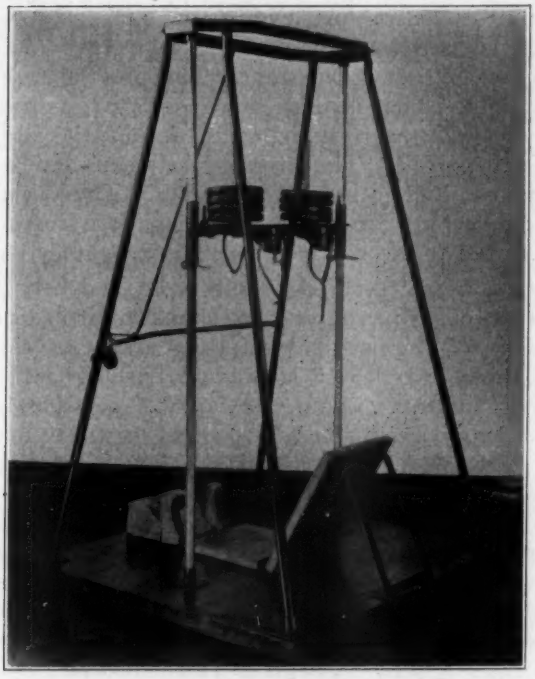
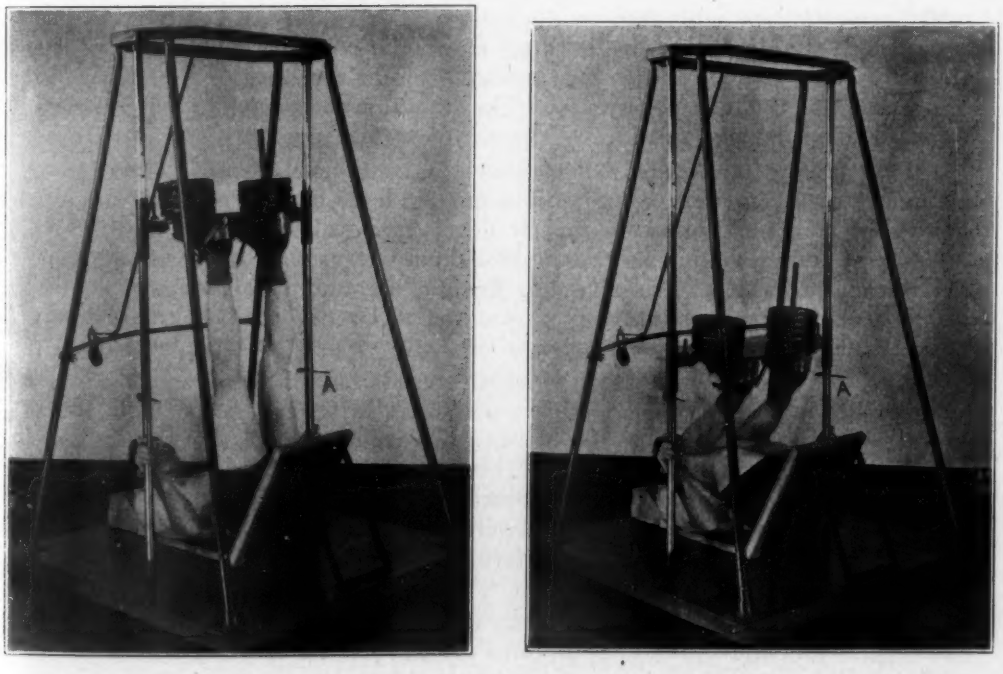


Fig. 6. — Leg-exercising apparatus (courtesy *J. Bone & Joint Surg.*).



A B

Fig. 7. — Leg-exercising apparatus being used to regain flexion. The pins (*A*) fit into the metal guides at different levels, to limit downward motion of the central plate.

complaint. In order to attain flexion in stubborn cases, it is necessary to exercise to the point of discomfort, even pain.

The apparatus is used in the following manner: The exercise begins with knees completely extended (fig. *7A*). The pins labeled *A* are removed, thus freeing the weight, which is then slowly lowered, as the knee is allowed to flex (fig. *7B*). The downward direction is continued as far as pain or tightness in the joint will permit. The knee is then completely extended; there is a momentary pause, and it is lowered again. The cycle is repeated ten to twenty times. The pins are replaced; the patient rests for a minute or so, and the cycle of ten to twenty repetitions is repeated two or three times.

Twenty patients with fractured femurs who had been discharged from general physical therapy as having attained maximum flexion were exercised with this apparatus. By the use of this apparatus, the average gain in flexion was 25 degrees in thirty-two days. However, these figures include values for 8 patients who had fractures about the femoral condyles or who had had prolonged immobilization because of slow union or refracture. They showed an average of 21 degrees in forty-two days. Twelve patients with uncomplicated fractures of the middle and upper thirds showed an average gain of 27 degrees in twenty-one days, a considerably more rapid rate of gain than that of the group first mentioned. Two of the 20 patients were treated by manipulation under anaesthesia in an attempt to increase knee-joint motion; one gained 6 degrees as a result of manipulation; in the other, no increase in flexion could be attained. Both were then given exercise with this apparatus; the former gained 33 degrees more flexion and the latter 20 degrees. It must be emphasized that the gains in flexion recorded in all 20 cases were made after the patients had received the customary physical therapy for weeks, sometimes months, and had been discharged because no further progress could be made. Constant bending, in the form of active heavy resistance exercises, will often produce more flexion than can be accomplished by a single manipulation or repeated manipulations. In a few cases, this strenuous flexion of the knee has produced slight swelling of the joint, but in no case has there been effusion. The swelling and soreness which sometimes develop usually subside by the next exercise period.

This apparatus can also be used as a muscle developer with increasing amounts of resistance after the patient has obtained a good range of motion. When the machine is used for muscle development alone, the same principle of exercise and method of increasing resistance are used as for the quadriceps exercises. When used for increasing flexion, the amount of weight that can be pushed back into complete extension ten to twenty times with moderate effort is employed.

Knee Unstable. — The most dramatic results have been obtained in cases of instability of the knee; 12 patients with such injuries have been subjected to these exercises. In each the ligamentous injuries were old and had not responded satisfactorily to previous treatment. The instabilities varied in nature: Nine had injuries to the anterior cruciate and tibial collateral ligaments; 1 had injury to the tibial collateral ligament, with marked relaxation; 1 had injury of the anterior and posterior cruciate and fibular collateral ligaments.

The type of injury did not seem to influence the results, inasmuch as rapid gains and alleviation of symptoms occurred in the extremely loose joints as in the less unstable joints. Four of the 12 patients were wearing Jones knee cages when they began the exercises. Two patients discarded the braces after fourteen days, one after twenty-one days and another after twenty-three days. In other words, the average time from the beginning of the

exercises to the time when the patients had enough quadriceps power to begin ambulation without the brace, safely, was eighteen days. Eight of the 12 were able after from four to six weeks to run and play ball without their braces and without "buckling" of the knee. Nine of the 12 had varying degrees of fluid and swelling when exercises were started; in 8 of the 9 these symptoms disappeared in one to three weeks. In 1 patient a slight amount of swelling persisted. Ten of the patients had pain on exercising and weight bearing initially; 7 lost the pain; 3 did not.

In all cases, after maximum benefit had been derived from the exercises, the instability persisted unchanged when the quadriceps muscle was relaxed. However, when the quadriceps muscle was contracted, it was impossible to demonstrate any looseness about the joint. A powerful quadriceps renders the knee stable only when it is contracted; but, when contracted, it offers sufficient stability for ordinary activities and, as demonstrated by some of our cases, even from rather strenuous sports. It is the purpose of the exercises to build the quadriceps muscle to the point that it is powerful enough to maintain the stability of the knee, without the full help of the ligaments. Normal quadriceps power is not sufficient for this, so greater than normal power must be built in the involved extremity. This explains why such extremely heavy resistance is used in cases of instability of the knee. In case of fractured femurs, post-meniscectomy conditions, et cetera, in which the knee is stable, the purpose is to restore normal power to the injured leg; therefore redevelopment is not pushed to such an extreme degree. In none of the 12 cases were there any ill effects from the strenuous program of exercise.

The splendid response of the patients to exercise alone suggests that in certain types of old ligamentous injuries, surgical repair may not offer more.

Knees Following Meniscectomy. — Patients who were to have meniscectomy were given quadriceps-setting exercises for several days preoperatively, and the exercises were resumed as soon after operation as possible, usually in twenty-four to forty-eight hours. Quadriceps setting was continued until the synovitis had largely subsided and the discomfort from weight bearing was minimal; this required three to four weeks. The heavy-resistance exercises were then begun, and with maximum exertion on these exercises the synovitis continued to disappear.

Twenty patients have exercised postoperatively by the heavy resistance method. Seventeen of the 20 had definite synovitis of the knee joint at the time exercise was begun, and in only 2 of them did the degree of synovitis fail to decrease. In no instance was there exacerbation of synovitis due to the strenuous exercise. No patient was allowed to participate in weight-bearing exercises until the quadriceps power had been restored in the limb operated on.

The average time required to restore normal power to the affected extremity was nineteen days. Only 2 of the 20 patients failed to regain normal quadriceps power, and these 2 developed their quadriceps power to within 80 per cent of normal. Restoration of normal power and thigh circumference can be expected to occur at a much more rapid rate following meniscectomy than following fracture of the femur, fracture of the patella, ligamentous injuries, et cetera, for which the period of immobilization is usually more prolonged. It must be stressed that following meniscectomy the quadriceps-setting exercises given postoperatively are as important as the heavy resistance exercises in obtaining good end results.

Restoration of a normal range of motion offered no problem in any of the 20 cases. All patients had normal knee joint motion on completion of

the exercise program. A few had difficulty in obtaining the last 15 or 20 degrees of flexion. These, however, responded rapidly to treatment on the leg-exercising apparatus (fig. 6).

Weight-Bearing and Non-Weight-Bearing Quadriceps Exercises

As far as increasing muscle power is concerned, weight-bearing and non-weight-bearing quadriceps exercises have equal possibilities. They differ, however, in the symptoms they produce in knee joints controlled by weak, atrophied muscles.

I believe that the development of pain, thickening and fluid on weight-bearing exercises in many patients following meniscectomy and with unstable knees is due largely to the increased laxity in the joint, resulting from quadriceps weakness and atrophy. I have seen many of these patients with marked synovitis in the knee joint in whom complete alleviation of symptoms referable to the knee occurred when quadriceps power was restored to normal by non-weight-bearing, heavy resistance exercises. The instability results in repeated strains which produce a traumatic synovitis with fluid, thickening and pain.

Of the 20 patients who had had meniscectomies, 17 had fluid, swelling or both of varying degree when they began these exercises, three or four weeks after the operation. On the exercise regimen outlined here, 15 of the 17 showed improvement. Of these 15 patients, 8 became completely asymptomatic, both subjectively and objectively; 6 retained only an insignificant amount of synovial thickening, and 1 finished the exercise program with a small amount of fluid still present in the joint. This patient had had a meniscus removed from the knee prior to Army service, following which there developed a chronic synovitis, with marked thickening and induration of the synovia. Before the exercise program was instituted for patients who had undergone meniscectomy, exercise in the gymnasium was started three or four weeks postoperatively, in an attempt to redevelop quadriceps power by the conventional methods such as stair climbing and bicycling. On this routine, not only was the hitherto smooth postoperative course of rapidly subsiding synovitis was interrupted, but in many cases there was a marked exacerbation of synovitis, which usually subsided as soon as the patient was taken off the weight-bearing exercises. It was then found that when these patients were given only non-weight-bearing exercises synovitis did not recur, and the synovitis which had previously developed subsided during the course of exercise. It must be assumed that there is some factor in the weight-bearing exercises that produces synovitis and that this factor does not exist in the non-weight-bearing exercises. These findings can be explained on the basis of relative instability of the knee. The quadriceps muscle is as important in maintaining knee stability as are the cruciate and collateral ligaments, and when this muscle group is atrophied and weak the maintenance of stability rests almost entirely on the ligaments. The ligaments alone cannot maintain as high a degree of stability as can be maintained when they are aided by the quadriceps muscle. When, as after meniscectomy, quadriceps power is low, there is abnormal motion in the knee joint. It is this abnormal motion that is indirectly responsible for the development of synovitis in patients performing weight-bearing exercises. The twisting, turning and jarring of the weight-bearing exercises in a relaxed joint probably traumatizes the synovia by nipping and stretching, causing a synovitis; whereas, if the exercises were performed while the patient is sitting down, the motion in the joint would be in a normal plane and the knee would not be under the strain of the body weight. Thus instability is precluded as a source of synovial irritation during convalescence.

Three patients who had flexion contractures of the knee rapidly regained complete extension by working on this apparatus. The pulley system (fig. 8) brings pressure to bear immediately above the patella by means of the leather cuff. The pressure is directed toward extension. On each repetition, as the knee reaches its maximum extension, the cuff aids the thigh extensors in effecting further extension. Strenuous quadriceps exercises were also given to these patients.

If the injury was a simple fracture of the patella or if the lower pole of the patella had been removed, the return of motion, strength and size was unusually rapid. However, if the patella was highly comminuted or if chondromalacia developed following fracture, the high resistance exercises

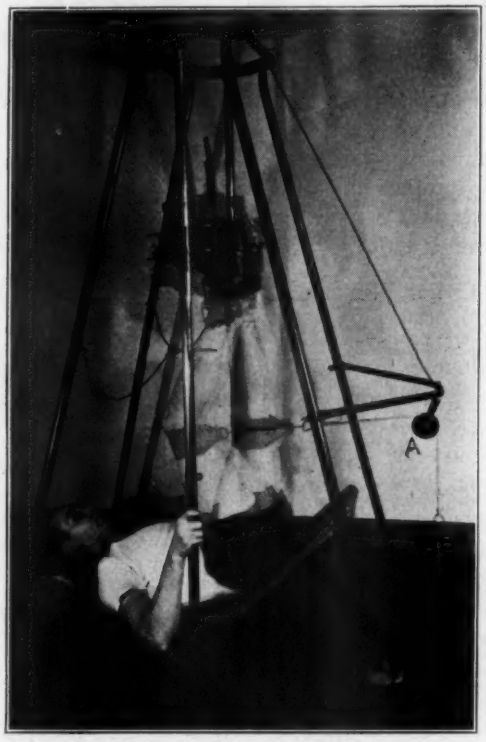


Fig. 8. — Leg-exercising apparatus, showing use of the pulley system (*A*) to increase knee joint extension.

usually caused much pain and occasionally fluid and swelling and had to be abandoned.

After the immobilization period following dislocation of the patella, these exercises were begun and a rapid return to normal was noted. By building an exceptionally powerful vastus medialis it might be possible to prevent redislocation of the patella when the dislocation is due chiefly to weakness of that muscle.

Two patients had chondrectomies for chondromalacia of the patella; following operation, both patients had moderate synovitis of the knee. In each, the synovitis subsided and smoothing of the patellofemoral articulation occurred as a result of these exercises.

There were many patients with soft tissue wounds about the knee and thigh. In these, loss of flexion or extension, due to muscular weakness, scarring or both, was the usual problem. In many cases in which the loss of

active motion was a result of muscular weakness due to loss of muscle substance the remaining muscle tissue could be overdeveloped sufficiently to compensate for the lost tissue, thereby restoring almost normal strength to the extremity.

Many patients had a limited range of motion because of scarring about the knee joint. Unless bound hopelessly to bone or other deep structure, these scars in most instances underwent remarkable softening, allowing for normal joint motion. The constant flexing in the leg-exercising apparatus (fig. 6) was sufficient in many cases to restore flexion to normal. The quadriceps exercise usually rapidly restored enough quadriceps power to make possible complete extension.

Results following removal of foreign bodies from the knee were similar to those following meniscectomy, unless there had been considerable damage to the joint.

In order to gain full extension following patellectomy, it is essential to have a powerful quadriceps. I have used this program of heavy-resistance exercises in only 2 such cases. The patients rapidly obtained complete extension, without development of synovitis, and quadriceps power was restored to within 90 per cent of that in the unaffected extremity.

When quadriceps power has increased sufficiently to permit weight-bearing exercises, the patient is given heavy resistance exercises for the other muscles of the extremity.

Development of Other Muscles of the Body by Same Exercise Principle

The following are some of the other exercises which I have used in redeveloping other muscles of the body by the same principle. The types of apparatus, however, vary considerably and are designed specifically to obtain the desired results. The repetitions, method of weight increase, frequency and length of workout are exactly the same as described for the quadriceps exercises.

1. *Lower Extremity*:

A. Hip Adductor Exercise (fig. 9.

B. Hip Abductor Exercise (fig. 10).

C. Hip Extensor Exercise (fig. 11).

D. Hip Flexor Exercise (fig. 12).

Figure 13 shows an arrangement that is used for giving any of the hip exercises when the knee is not stable enough, either from muscle weakness or from ligamentous damage, to allow weight to be attached to the foot.

E. Hamstring Exercise. — Figure 14*A* shows the non weight-bearing method and figure 14*B* the weight-bearing method.

F. Stair Climbing Exercise. — This exercise is not used to develop the quadriceps; it is not used at all until the patient has built nearly full quadriceps power by the use of previously described quadriceps exercises. Resistance is added to a metal yoke, and the patient goes over and back five times with one weight, rests a minute or so, adds more weight and then repeats. By use of the yoke, the hands are free to grasp the rail (fig. 15). This exercise was thought necessary because, even though a patient may have good quadriceps power, he may still have some difficulty in stair climbing if all the other muscles involved are not proportionately developed. The exercise develops, in the low repetition, high resistance manner, all the muscles involved in stair climbing.

G. Calf Exercise. — The resistance in this exercise is applied by adding weight to the yoke. The use of the yoke permits the hands to remain free, and the patient can use his hands to steady himself and maintain balance by

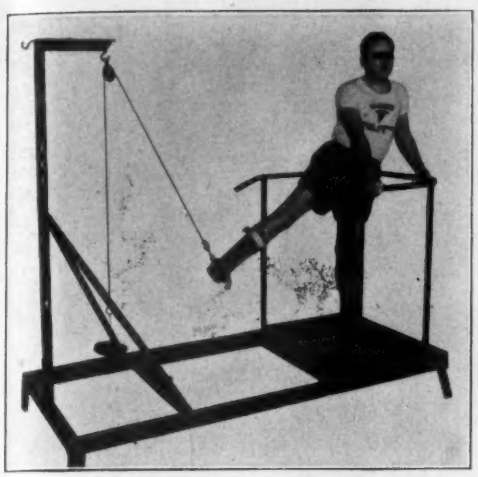


Fig. 9. — Hip adductor exercise

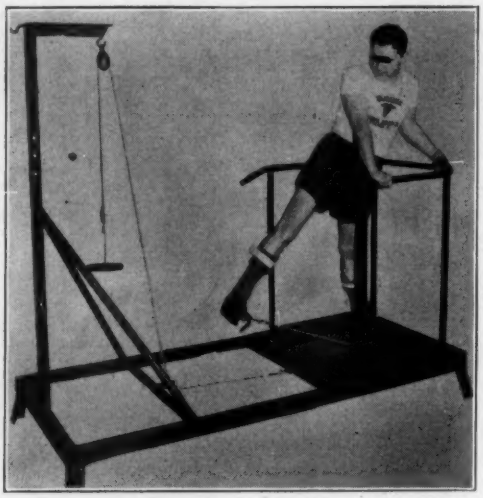


Fig. 10. — Hip abductor exercise

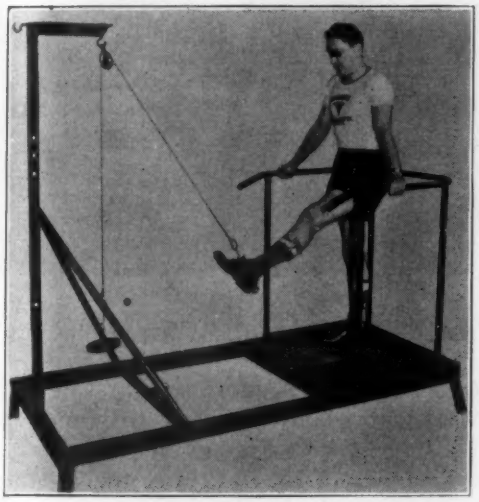


Fig. 11. — Hip extensor exercise

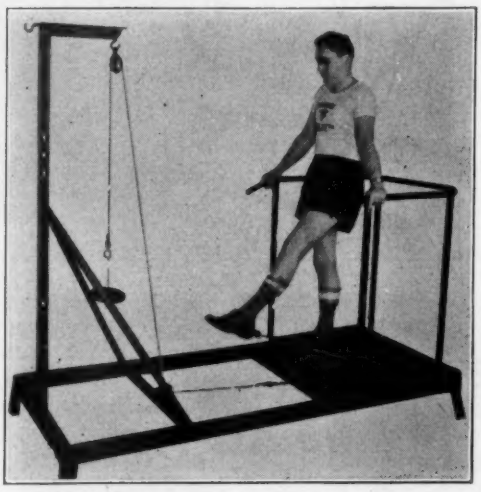


Fig. 12. — Hip flexor exercise

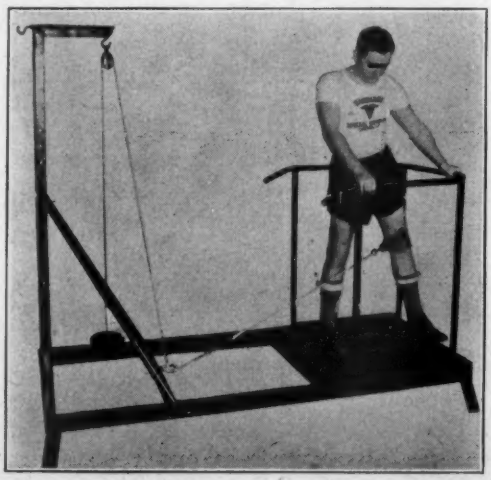


Fig. 13. — Hip exercises when the knee is not stable enough to allow weight to be attached to the foot.

A B

Fig. 14. — *A* shows the non-weight-bearing method and *B* the weight-bearing method.

grasping a bar in front of him. As strength increases, more weight can be added, and, as ankle joint motion increases, the wooden block can be made higher (fig. 16).

H. Ankle Exercise. — The apparatus shown in figure 17 was devised to exercise the ankle in both dorsiflexion and plantar flexion, in eversion and in-

Fig. 15. — Stair-climbing exercise

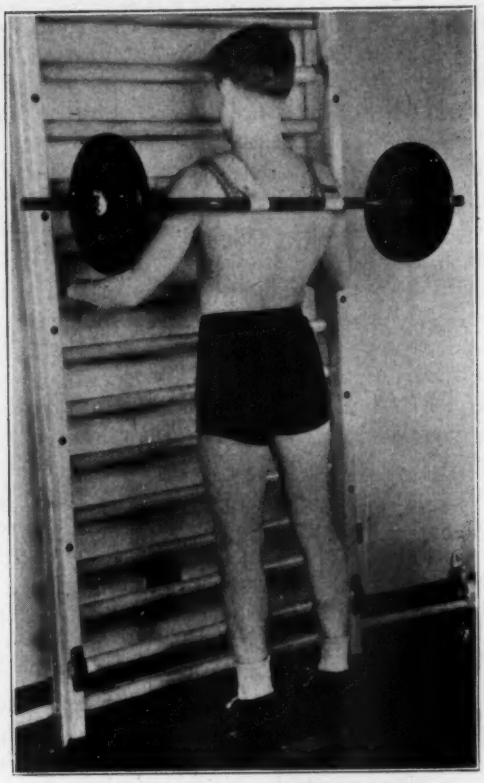
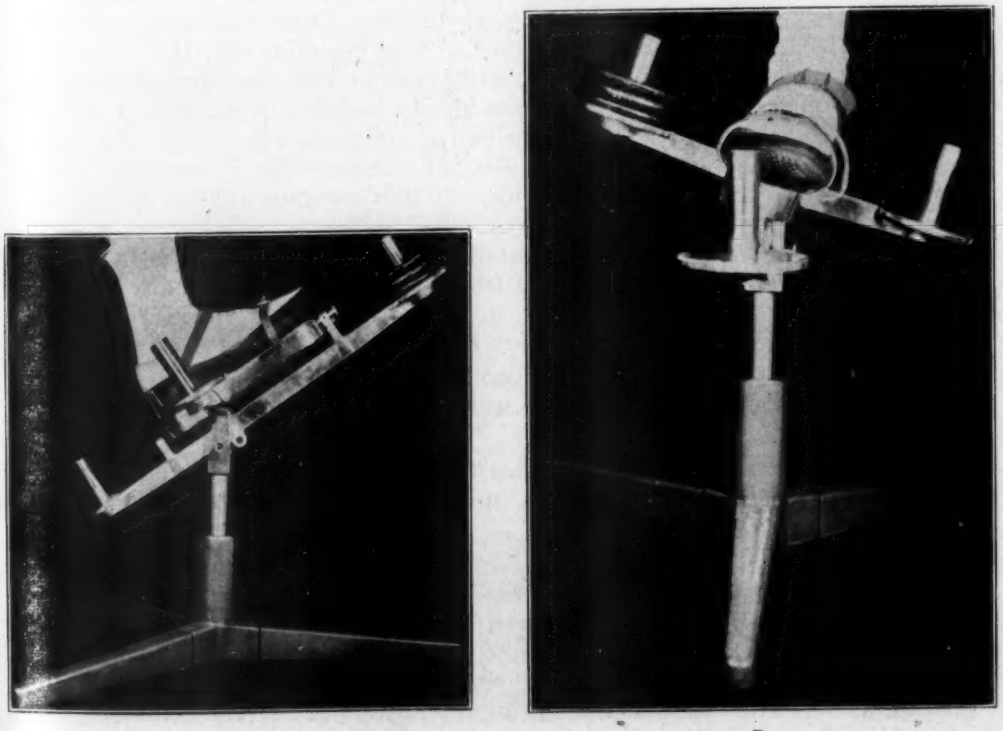


Fig. 16. — Calf exercise



A B

Fig. 17. — Ankle exercise

version. Resistance may be added to any of the four weight pans. The apparatus is also used to help restore ankle joint motion.

11. *Arm and Shoulder:*

A. Pectoral Exercise. — Amazing hypertrophy of the pectoral muscles can be attained in two or three weeks through the practice of this exercise (fig. 18). Two patients, who sustained machine gun bullet wounds through the axilla with resultant damage to the pectoralis major and limitation of abduction because of scar tissue, were able to loosen the scar sufficiently to obtain a complete range of shoulder motion by use of this exercise. In both cases, after a month of exercise, the patients had increased the size of the atrophied pectoralis so that it was larger than the corresponding uninjured muscle.

B. Deltoid Exercise (Fig. 19) —

C. Biceps Exercise. — This is an important exercise, as there exists usually an inch or so of atrophy of the arm following immobiliaztion for fracture of the humerus. It is important not only because it redevelops biceps power but also because of its value in increasing elbow joint motion. I believe that exercising for biceps power will do more to restore elbow joint motion than all efforts to increase motion of that joint while neglecting biceps power. This statement does not hold in instances in which there is a mechanical block or in which severe irreparable capsular and pericapsular changes have occurred. On each repetition the patient should make every effort to obtain as much flexion and extension as possible. Triceps exercises should also be used in conjunction with the biceps exercise.

D. Supine Press. — This exercise is illustrated in figure 20. It is extremely good for loosening up the elbow and shoulder joint.

E. Pulley Exercise. — Restoration of normal scapulohumeral motion following a fracture of the humerus is often difficult. In most instances I have obtained good results through use of this pulley exercise, combined with the pectoral, biceps and deltoid exercises. It is essential that the pulley be an extremely high one, so that the arm can go into complete abduction (fig. 21). On each repetition the arm should be allowed to abduct as far as comfort will permit the weights to pull it; then the arm is brought back to the side; there is a momentary pause, and the exercise is repeated. This is done ten times; more weight is added, and it is repeated another ten times, et cetera. An effort should be made to abduct the arm a little farther on each repetition. This exercise has produced good results in cases in which scapular motion is limited because of fractures of the scapula and large soft tissue defects. The constant forcing, in the form of active, heavy resistance exercises, steadily increases the motion of the joint.

F. Parallel Bars. — This is a good exercise for the shoulder and arm (fig. 22). Resistance is added to the weight pan strapped to the back. The width of the bars can be varied.

G. Arm-Exercising Table. — This table is designed to exercise the pronators and supinators of the forearm, and the external (fig. 23) and internal (fig. 24) rotators of the shoulder.

III. Trunk

A. Back Exercise. — Hyperextension exercises are done on the apparatus shown in figure 25. This apparatus offers several improvements over the method in general use. The weight pan attached to the back (*A*) makes possible increases in accurately graded resistance. This cannot be accomplished, as was attempted in the old method, by progressively extending the patient farther over the edge of the table. The present method does not require an operator to hold the patient's feet. The position of the patient

Fig. 18. — Pectoral exercise (courtesy *J. Bone & Joint Surg.*).

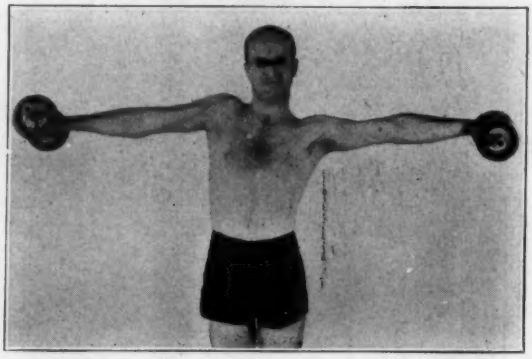


Fig. 19. — Deltoid exercise

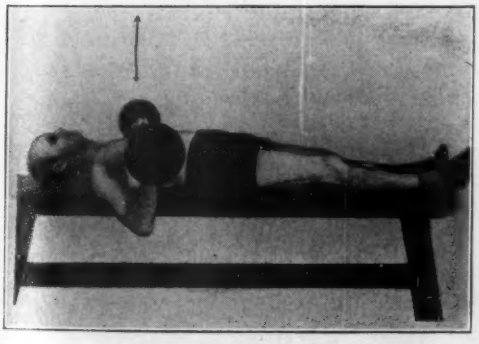


Fig. 20. — Supine press

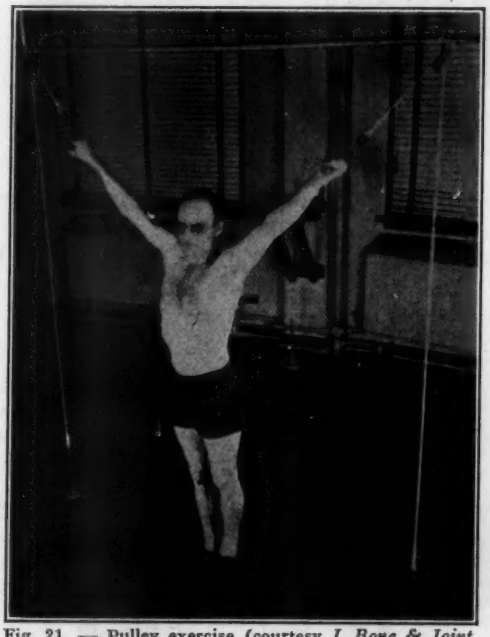


Fig. 21. — Pulley exercise (courtesy *J. Bone & Joint Surg.*).

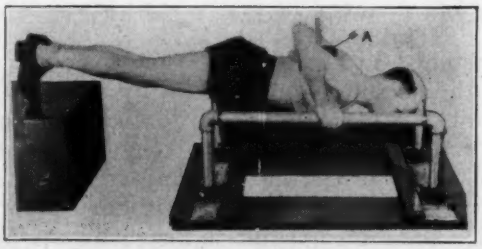


Fig. 22. — Parallel bars

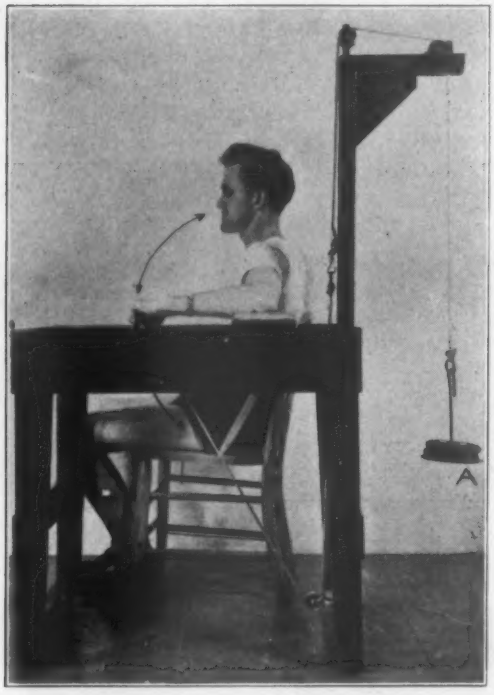


Fig. 23. — Arm-exercising table

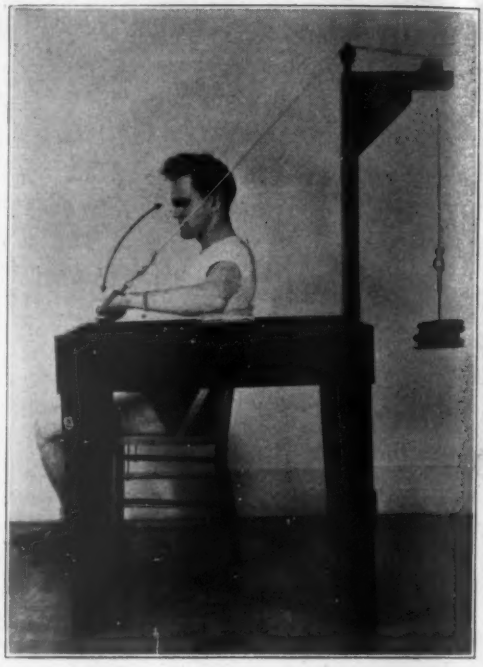


Fig. 24. — Arm-exercising table

is more stable and comfortable; and, since he is not quite parallel to the floor, it is much easier for him to hyperextend more completely.

B. Abdominal Exercise. — These exercises are given on the apparatus shown in figure 26. Resistance is offered by springs attached beneath the

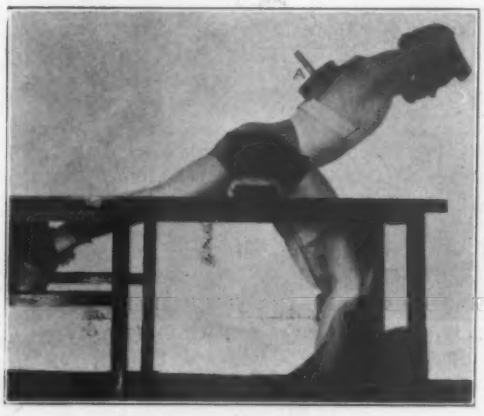


Fig. 25. — Back exercise

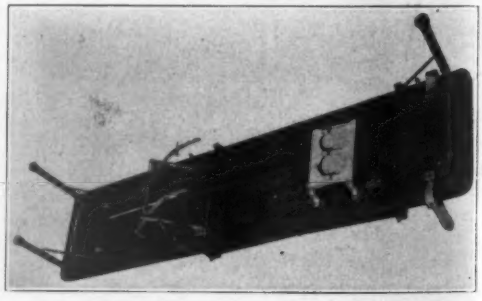


Fig. 26. — Abdominal exercise

board. A rope is fastened to the springs, runs over the pulley and is attached to a ring on the shoulder straps worn by the patient. Each spring offers a maximum pull of 5 pounds, and up to eight springs can be applied.

When the knees and hips are kept flexed (fig. 27) more of the load falls on the abdominal muscles and less on the iliopsoas muscle. This makes possible development of the abdominal muscles without concurrent development of the iliopsoas. Since the lumbar spine is flexed by the abdominal muscles and extended by the iliopsoas, the selective redevelopment of the abdominal

muscles brings about stronger pelvic control, which is of great value in the treatment of certain back ailments. Many patients who have received injuries to the anterior abdominal wall, with resultant loss of muscle tone and tissue, have exercised on this apparatus with considerable improvement. Graded resistance increases are made by increasing the number of springs.

When it is desirable to exercise without hip and knee flexion the arrangement shown in figure 28 is used.

Only a few of the exercises actually used have been mentioned. With the equipment illustrated, several hundred different exercises can be worked out. I have shown only a few of those most frequently used, but, in order to conduct exercise programs properly, both for range of motion and for muscle power, in a great variety of injuries, a therapeutic gymnasium must be equipped with the apparatus described.

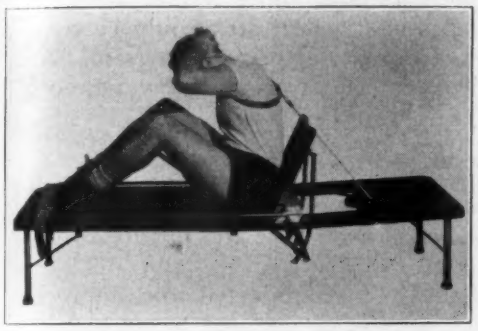


Fig. 27. — Abdominal exercise

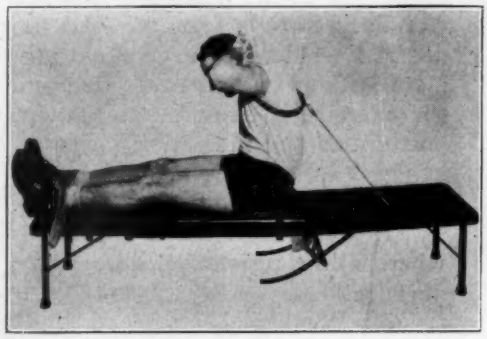


Fig. 28. — Abdominal exercise without hip and knee flexion.

The Therapeutic Gynasium

The therapeutic gymnasium should not be a place of amusement or for keeping fit. It should be a place which a treatment, prescribed after thorough examination by the medical officer, can be properly given. The gymnasium should be supervised by the medical officer, but it is not necessary that he actually attend the exercises. The gymnasium should be planned and constructed as specifically for its purpose as is the operating room for its purpose. All pieces of exercise apparatus should be designed to produce a desired result in a specific type of case. Accurate notes on the progress of each patient should be made at regular intervals. The patient should work by appointment, and his attendance should be recorded. The appearance of the gymnasium and the working condition of the equipment are very important, for the patient will maintain much more interest in his exercise if the gymnasium is bright, colorful, well ventilated and well kept. Equipment in poor condition not only is dangerous but also disheartens the patient and makes it difficult for him to perform his exercises.

It is a good policy to work out several different ways of doing the same exercise. This will prevent the patient's losing interest from monotony. The greater the variety of exercises, the greater the patient's interest.

It has been my experience that greater cooperation is achieved when the patient understands the nature of his injury. Anatomic charts are kept and are exhibited on the walls, to give him a clear conception of his disability and its location. He also can see what muscles have to be redeveloped or what joints must be loosened up before he can attain maximum benefits. A chart with the normal ranges of motion for all the joints of the

body should be displayed, and the patient should be taught the normal range of the joint upon which he is working. He should become familiar with the measurements of his affected part, the power of that part and the exact number of degrees of motion present; then, each week, when new measurements are taken, he will know in inches, degrees and pounds the gains he has made. This will do much toward maintaining the patient's interest.

The instructor should be efficient, should be thoroughly familiar with each patient's disability, know what he is trying to accomplish in that patient and, above all, display interest in the work. A patient cannot be expected to show any more enthusiasm than the one who supervises his exercise.

Although this program of exercise was developed primarily to expedite the recovery of injured soldiers in the war, there is a definite civilian need for a similar program. From wartime experience there has arisen an acute awareness of the necessity of proper muscle reeducation and redevelopment. Certainly, such a program will be essential for the proper treatment of industrial accident patients. No physical medicine department could be complete without a well controlled and operated exercise therapy program. As the exercise is explored as a therapeutic agent there arises many new opportunities and indication for its use.

Conclusions

1. High resistance, low repetition exercises build powerful muscles, whereas low resistance, high repetition exercises produce the quality of endurance.

2. Weakened, atrophied muscles should not be subjected to endurance-building exercises until the power muscle has been restored to normal by power-building exercises.

3. Restoration of muscle power with return of motion in a limb has been neglected in the past. It is in most instances preferable to have a limited range of motion with good power rather than to have normal range of motion with inadequate power.

4. Games and group exercises, as practiced in reconditioning programs, are unsatisfactory for producing focal muscle development.

5. Extreme atrophy and fibrosis appearing in muscles following prolonged immobilization are not contraindications for strenuous resistive exercises.

6. Knees unstable either from loss of ligamentous support or muscle atrophy should refrain from full weight bearing activities until the quadriceps power has been restored by non-weight-bearing exercises.

ARCHIVES of PHYSICAL MEDICINE
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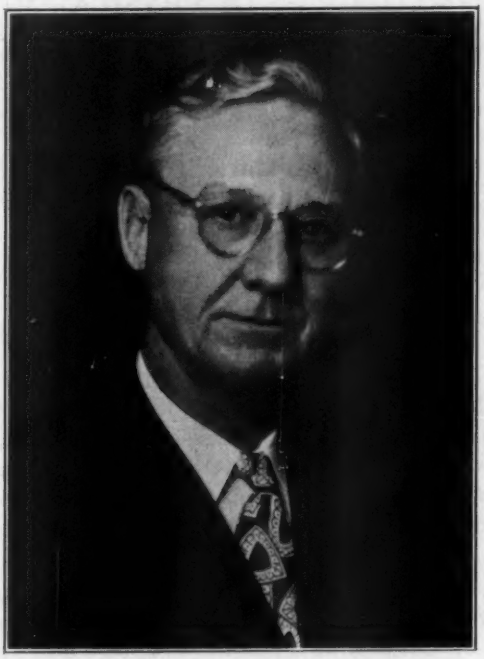
.·. EDITORIALS .·.

SPEAKER OF THE HOUSE OF DELEGATES OF THE AMERICAN MEDICAL ASSOCIATION



ROY W. FOUTS, M.D.
Photo by Joseph Merante

Dr. Roy W. Fouts, one of the founders of the American Congress of Physical Medicine, radiologist and medical legal consultant, of Omaha, was reelected speaker of the House of Delegates of the American Medical Association at the Ninety-Fifth Annual Session, held at San Francisco, in July. Dr. Fouts was born May 10, 1885, in Davis County, Iowa. He was graduated from the Southern Iowa Normal School in 1902 and received his medical training at the Medical Department of the University of Illinois. Since entering on the practice of medicine he has served as Division Surgeon, Chicago and North Western Railway; medical advisor, Nebraska Workmen's Compensation Court; president, Nebraska State Medical Society; chairman, Nebraska State Medical Legal Defense Committee; chairman, Medical Preparedness Committee of the American Medical Association for the Seventh Corps Area, and chairman, Procurement and Assignment Service for the Seventh Service Command. He has also served as director of the Omaha Chamber of Commerce.

Dr. Fouts became a member of the House of Delegates of the American Medical Association in 1922 and was elected Vice-Speaker in 1938. In December, 1945, he was elected Speaker of the House and reelected in 1946.

He is also Secretary and Director of the Omaha Midwest Clinical Society. He was the first Secretary-Treasurer of the Congress, holding this office until he was elected President, in 1930.

In addition to carrying on an extensive practice, Dr. Fouts has found time to contribute many articles to the medical literature and to indulge in his hobbies, golf, hunting and football.

1946 ANNUAL MEETING

AMERICAN CONGRESS OF PHYSICAL MEDICINE

The 24th Annual Meeting of the American Congress of Physical Medicine, held at the Hotel Pennsylvania, New York, September 4-7, 1946 — the first Post-War Meeting of the Congress — reported impressive advancements of Physical Medicine in research, education, as well as in medical rehabilitation of war and industrial injuries and in general lines of therapy. In spite of the still prevailing difficulties in travel and hotel accommodations a total registration was close to 800 and the attendance came to a large extent from far-flung places of the United States and there were also guests from Canada England and France.

Leaders of medicine in New York welcomed the Congress at its opening session on September 4th when Dr. Miland E. Knapp of Minneapolis who carried the presidency for two years during the war, turned his gavel over to the President-elect, Dr. Walter S. McClellan of Saratoga Springs, New York. Dr. McClellan's presidential address stated that the future development of medicine will depend on the intelligent application of physical forces in diagnosis and treatment. It also emphasized the importance of treating the body as a whole, as exemplified by the various methods of hydro and balneo therapy.

A message of greeting, read by the secretary, from Lord Horder as President of the British Association of Physical Medicine served to introduce Sir Morton Smart of London as an honored guest and representative of the British Association of Physical Medicine. Sir Morton's address "The Influence of Muscle Action on Tissue Repair" was the highlight of the opening session. He elucidated masterfully the physiologic and pathologic aspects of muscle injuries so often neglected in the after treatment and pointed out the value of graduated muscle contractions to preserve or speed up return muscle function by their early use. Later on in the session, Sir Morton Smart demonstrated his method by moving pictures as well as by actual application.

A total of 50 papers were presented during the three and a half days' session. It is highly significant of the results of the well planned educational and research activities inaugurated by the Baruch Committee on Physical Medicine that one-half of these papers represented basic research or reports on educational activities. Among these presentations were: "The Growing Importance of Physics in the Premedical and Medical Curricula," by Dr. Francis O. Schmitt, Head of the Department of Biology of the Massachusetts Institute of Technology, a close liaison having been established with this institution for the teaching of basic physics to specialists in physical medicine (physiatrists); "Studies on Ultraviolet, Infra-Red and Short Wave Dosimetry," by Kurt S. Lion of the same institution; also studies of the radiation coverage of Infra-Red generators by Leopold Rovner of the State University of Iowa. On the more clinical side of the studies inaugurated by the Baruch Committee there was a presentation on the evaluation of disability

and treatment of Hemiplegia by Harold Dinken of the University of Colorado School of Medicine; he stressed the possibilities of early rehabilitation of patients by teaching self reliance and daily routine activities and emphasized that better results are obtained by working with the patient than by "working on him." A study on the significance of fitness by Robert C. Darling of Columbia University brought out that there is no real evidence in humans that unusual physical fitness imparts immunity or resistance to disease and therefore there is no conclusive warrant for urging intensive physical training on the general population. It cited the need for a better method of evaluation of fitness and declared that the relationship of physical fitness to general health could be determined only by the collaborative efforts of clinicians, educators and public health officers.

Among papers presented by members of the Congress and invited guests, many dealt with the rehabilitation of the war injured and its impetus on future civilian practice. Louis B. Newman of the Veterans Hospital at Hines, Illinois, brought out that the hopelessness of World War I patient with spinal cord injury has largely vanished due to the intelligent combination of general medicine, urological care and all forms of physical and occupational therapy. An automobile entirely hand controlled is utilized when the patient has sufficiently recovered, for performing activities for daily living; shop retraining program enables earning a livelihood and leads to full rehabilitation. Similar principles in the rehabilitation for amputees were demonstrated in papers by Drs. D. L. Rose of Silver Springs, Maryland, and G. W. Soffe of Washington, D. C.; Donald A. Covalt, Assistant Medical Director of the Veterans Administration reported on the large scale utilization of physical medicine for rehabilitation in the 114 Veterans hospitals; in these institutions some 78 physicians qualfied in physical medicine now act under the direct supervision of a national board of consultants in physical medicine. Col. B. A. Strickland, Jr., Director of Physical Medicine, Consultant's Division, Office of The Surgeon General, United States Army reported on the recognition of physical medicine as a division on par with surgery and general medicine in the Army and on the program to train medical officers as specialists in physical medicine.

Presentations of special interest were those of Drs. G. M. Piersol and J. L. Hollander of the University of Pennsylvania on The Optimum Exercise-Rest Balance in the Treatment of Rheumatoid Arthritis. They pointed out that much of the disability in these patients is not due directly to the illness but rather to unskilled physical management during illness and outlined a program of early general and local exercises to be carried on systematically with fatigue or spasm as a sign to stop. Orthopedic surgery will be rarely needed in cases where optimum exercise—rest balance has to be maintained. A preliminary report on what may be a significant phase in research on the mental aspects of fatigue was given by Dr. A. L. Watkins and his associates of Harvard University. Another welcome guest from London, Dr. Russell J. Reynolds of Charing Cross Hospital demonstrated his work on cine-radiography, the taking of actual moving pictures of the movements of internal organs and joints. This demonstration caused considerable interest. Later in the session Dr. Irving Rehman of the University of Southern California School of Medicine showed a Study of the Kinematic and Dynamics of the Human Gait and Its Application in Poliomyelitis, carried on under the auspices of the Baruch Foundation producing moving pictures of great excellence of human joints.

The Annual Dinner of the Congress on the evening of September 5 was attended by some 260 Fellows, their families and many guests. The President, Dr. Walter S. McClellan acted as Toastmaster. Major General Norman

T. Kirk, The Surgeon General, United States Army, reported on the work in Physical Medicine Reconditioning during World War II and bespoke the assistance of the Congress in the Army's Physical Medicine Service Training Program, in order that the future peacetime Army might receive the best possible care. The other two speakers, Captain H. H. Montgomery of the U. S. Navy and Donald A. Covalt of the Veterans Administration spoke in a similar vein. The awards for outstanding scientific exhibits were announced as well as the awarding of the Gold Key of the Congress to Dr. Ralph Pemberton, Professor of Medicine of the Graduate School of the University of Pennsylvania in recognition of his work in arthritis and in the advancement of Physical Medicine. Musical renditions by Mrs. H. A. Carter and her sister, Mrs. Rush added greatly to the enjoyment and color of the evening.

The yearly instruction seminar in connection with the meeting was attended by nearly one hundred physicians or registered physical therapists. Its subject matter laid special emphasis on basic sciences, functional anatomy, physiology and electricity in relation to physical medicine; new subject matter was physiologic studies on pain, muscle reeducation, therapeutic exercise, and reconditioning, peripheral nerve injuries and low back conditions. This seminar served as a refresher course as well as an orientation course on new developments.

There were 16 scientific exhibits on different subjects, most of them with active demonstrations on models or patients. Among these were: "Nuclear Energy," by Howard A. Carter, Secretary of the Council on Physical Medicine; "Technology and Medicine," by Kurt S. Lion, of the Massachusetts Institute of Technology; "Rehabilitation of the Paraplegic," by Major Henry Kessler of the Veterans Administration; "Heavy Resistance Exercise," by T. L. De Lorme, Jr.; "Reconditioning in Chest Diseases," by O. L. Huddleston of the University of Southern California; "Ultraviolet and Blood Irradiation," by George Miley, and G. J. P. Barger. The exhibit on "Cold Injuries to the Limbs and Their Treatment," by I. D. Stein of Montefiore Hospital, New York received first award for merit; that on "Radiation Pattern Scanner," by Leopold Rovner and co-workers of Iowa City received second award and that of Dr. Lion, already mentioned, third award.

Technical exhibits by 24 exhibitors showed much progress in various types of apparatus. Short wave diathermy generators built under the new specifications of the Federal Communications Commission avoiding radio interference were on display, also several electronic low-frequency generators newer types of hydro therapy apparatus were also shown.

A luncheon tendered by the Baruch Committee to the Baruch Fellows and to the Officers of the Congress and their invited guests was the final event of the session.

Mr. Bernard M. Baruch, in his role of the great humanitarian, voiced his satisfaction of the work carried out; Dr. Frank H. Krusen, Director of the Baruch Committee reported on the inspiring progress made. Sir Morton Smart expressed appreciation of the visitors from abroad and added delightful touches of sentiment and humor.

The 1946 Session of the American Congress of Physical Medicine marks another milestone to the recent dramatic progress of Physical Medicine in the United States. It excelled every previous convention in the extent of basic research work reported as well as in the number of new Fellows elected. The presence of distinguished guests from abroad added a welcome international flavor and stimulated efforts to extend research collaboration for the future. The program also demonstrated the firm cooperation established with the Physical Medicine services of the Veterans Administration and

the U. S. Army and Navy; this should result in a higher type of service to the personnel affected and in a much greater field of clinical activity for physiatrists.

The proceedings at all sessions were carried out on time and the interest displayed by the large attendance was at all times most satisfactory. Credit for the effective planning and execution of the program is due to Dr. Walter J. Zeiter, Executive Director, and to Dr. Earl L. Elkins, in charge of the instruction seminar as well as to the cordial teamwork of the presiding officers, the members of the various Committees and of the Central Office under the leadership of Miss Marion G. Smith.

R. K.

AWARD OF MERIT BY THE AMERICAN CONGRESS OF PHYSICAL MEDICINE FOR THE YEAR 1946

In recognition of distinguished contributions to the medical science of physical medicine the Gold Key award was made to Dr. Ralph Pemberton, professor of medicine in the Graduate School of the University of Pennsylvania at Philadelphia. Dr. Pemberton was given the award in recognition of his research on arthritis and for his many published articles and texts in the field of physical medicine.

AWARDS TO SCIENTIFIC EXHIBITORS

The Committee of Awards for Scientific Exhibits presented through its Chairman, Dr. William Schmidt the following awards:

First Place to Leopold Rovner, M.S.; William D. Paul, M.D., and Harry M. Hines, Ph.D., College of Medicine, State University of Iowa, for their exhibit, Radiation Pattern Scanner.

Second Place to Irwin D. Stein, M.D., Montefiore Hospital, New York, for his exhibit, Cold Injuries to the Limbs and Their Treatment.

Third Place to Kurt Lion, D. Eng., Massachusetts Institute of Technology, Cambridge, Technology and Medicine.

Honorable Mention to Franz M. Groedel, M.D., New York, Heart Sounds —Recordings.

MEDICAL NEWS

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American Congress of Physical Medicine
1947

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John S. Coulter, M.D., Chicago, Treasurer.

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Secretary.

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Society of Physical Medicine
Officers, 1947

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Program Committee — **Frank H. Krusen, M.D.,** Rochester, Minn.; **Walter M. Solomon, M.D.,** Cleveland, and **Arthur L. Watkins, M.D.,** Boston.

ADDRESSES OF GUEST SPEAKERS
ANNUAL CONGRESS DINNER, 1946

Address of Major General Norman T. Kirk, The Surgeon General, United States Army.

It is a pleasure to be here tonight to extend greetings to the American Congress of Physical Medicine, and I think we should pay tribute to Mr. Bernard Baruch for the contribution and stimulation he has given to this Congress and to physical medicine in the United States.

I also want to congratulate Dr. Krusen and the members of his Committee, the Baruch Committee, that made such a great contribution to physical medicine. I am sure that in the future it will aid materially in the effort that has been so well carried on in the past.

Mr. Baruch's foundation has not only aided in necessary professional and technical research but has also made available fellowships for the instruction of individuals, both male and female, so that sufficient trained personnel will, we hope, soon be available to carry on the all-important treatment afforded by physical medicine in the rehabilitation of the physically and mentally handicapped in our civilian as well as our military hospitals.

Physical therapy really had its beginning and demonstrated its worth in medicine, insofar as the Army was concerned, in World War I. Limited numbers of officers were trained in this specialty in the Army's larger general hospitals in the peacetime period between the two wars. A school of instruction was maintained at the Walter Reed General Hospital in physical therapy from which classes of physical therapists were graduated yearly. This school filled the needs of our peacetime Army for well trained physical therapy aides, as Medical Department civilian employees. During World War II, they were given the same recognition as the Army Nurse Corps—commissioned status.

Unfortunately, physicians trained in this specialty available to the Army to head Physical Therapy Departments in our general and station hospitals during the war period were far too few. To meet this need some 89 medical officers were given a 3-month course of training at the Mayo Clinic between 1942 and 1945. Others interested in this specialty were given on-the-job training under the direction of trained medical officers.

There were 75 physical therapy aides in the Army in 1941. Recruitment of physical therapy aides trained in civil life proved insufficient, necessitating the setting up by the Army of ten physical therapy training schools in general hospitals. In these, 1,039 physical therapy aides were trained and graduated. In addition, 278 physical therapy aides who received their school phase of training in civilian hospitals completed their apprentice training in Army general hospitals. One thousand six hundred eighty-eight (1,688) physical therapy aides were commissioned in the Medical Department of the Army up to July 31, 1946. These aides served not only in our general and station hospitals here at home but, likewise, in some 217

general hospitals throughout the world. They did a splendid job.

Much more difficulty was encountered in getting the occupational therapy program under way, both in the procurement of trained occupational therapy aides, personnel, and schools in which to train them, and in the procurement of supplies.

Owing to the lack of funds available to the Medical Department of the Army, the occupational therapy program which was instituted in World War I soon had to be sharply curtailed; hence on December 7, 1941 only 12 occupational therapy aides were on duty as civilian employees. They were not commissioned during World War II but were carried as civilian employees. Recruitment of trained occupational therapy aides from civil life was slow and disappointing; so to meet our needs an accelerated twelve-month course in occupational therapy was formulated in 1944. This was instituted under War Department contracts with eight civilian occupational therapy schools. They each provided four months formal training which was followed by eight months apprentice on-the-job training in Army general hospitals. From July, 1944 to June, 1946, 545 occupational therapy aides were so trained. An additional 150 students from civilian schools received their clinical training in Army hospitals.

At the peak of operations, some 900 occupational therapy aides were on duty.

The importance of a curative workshop in occupational therapy, under the direction of a well-trained, interested and sympathetic occupational therapy aide, cannot be overestimated. Her guidance and leadership in diversional or functional occupational therapy in the treatment of the psychotic and psychoneurotic, as well as the bedridden and convalescent, medical and surgical patient, is equally important and supplements and assists and aids in physical medicine after physical therapy has completed its job. The Red Cross, fortunately, did a splendid job for the Medical Department in diversional occupational therapy with paid workers in our hospitals overseas and volunteers at home while our program was getting under way, and later materially assisted the trained occupational therapy aides in this most important work. I should state that in our hospitals 85 per cent of our work is diversional, whether it is rug weaving or not, and I am for it.

Physical reconditioning in an original manner was practiced to a very limited extent in World War I—not at all in our peacetime Army. In the spring of 1943, during the Tunisian Campaign, I had an opportunity to see a physical rehabilitation battalion in the British Army in a tent camp on the sand dunes of North Africa. These men had recovered from severe illness or wounds, some still wearing plaster casts, and had been released from hospitals and were being, according to their physical limitations, toughened and readied for return to duty, under the guidance of trained medical officers and male physical training sergeants. To a lesser degree — and not at that time well organized—this was also getting under way in a convalescent hospital in the Mediterranean Theater of Operations.

A need was seen for an extensive physical reconditioning program, so that the soldier who had recovered from illness, battle wound or injury could be more quickly returned to duty. To return to training or rejoin his outfit in combat, it was necessary that his mental and physical condition be as good as or better than it was when he became a casualty. And for those who because of physical or emotional disability must be separated from the service, a similar mission was seen.

Physical reconditioning to accomplish this mission was initiated by the Surgeon General's Office in the winter of 1943. Patients were classified into categories: i. e., class 4—bed patients; class 3 — ambulatory patients still in hospital; class 2—hospital care no longer necessary, housed in barracks and formed into companies; and class 1—advanced, eight hours of drill, instruction in school of the soldier, marches, recreation and games, then to duty. Gymnasiums were constructed at each general hospital, which included curative gymnastics focused on improvement of the specific disability—a bad back, a stiff ankle, shoulder, or knee. Convalescent sections were established at each general hospital, and later, when the patient load grew greater, convalescent hospitals were established in abandoned cantonments to house 50,000 patients. Swimming pools were built and athletic fields enlarged and improved. Psychiatric patients were removed from hospitals, placed in companies and battalions in convalescent hospitals under the guidance of a trained psychiatrist and clinical psychologist. Large shops were established: i. e., machine, wood-working, and automobile repair, for diversional and prevocational training for the handicapped. To the thirteen convalescent hospitals were admitted 212,000 patients, and the limitation type of physical and mental reconditioning was prescribed by the attending physician and carried out under his guidance.

Educational reconditioning under information and education officers was later added, particularly for the handicapped, before return to civil life.

The Adjutant General was requested to comb the Army for officers and enlisted men who had been physical directors in civil life, were graduates of schools of physical training or had coached athletics. These officers and men, as well as others having no formal training, were ordered to a School for Reconditioning Instructors which was established early in 1944 at the Medical Department Training Center at Camp Grant, Ill. Later this Center was moved to Fort Lewis, Wash. Educational reconditioning officers and men were later trained at the School for Personnel Services at Lexington, Va. At these schools 3,616 officers and men were trained as physical and educational reconditioning instruc-

tors. Outstanding civilian instructors were brought in from civil life as consultants to give advice and assistance in the training of these officers and men in physical reconditioning.

Similar programs in reconditioning were likewise set up for conditioning troops for return to duty in overseas theaters. Two reconditioning centers were operating at maximum capacity in the European Theater in the Spring of 1944. This program was greatly expanded and won the praise of all line, as well as medical, commanders who saw the work done. It was outstanding. I had the pleasure of seeing these operations twice that year.

The overseas reconditioning program played no little part in returning to duty in the theater 375,000 of the 598,000 battle wounded. This is just an example and only a small part of their accomplishments.

Physical medicine "grew up" in this manner during the war period, without adequate prewar planning and with total lack of trained personnel and facilities to accomplish its mission, but nevertheless the results were epoch making. Thanks to Mr. Baruch for his vision and philanthropy and to the work of his Committee, we are confident that physical medicine will be better able to support the Medical Department should we be so unfortunate as to be faced with another war.

I am delighted to hear that the Veterans Administration is going to continue to work along the lines that we started and ran for two or three years as did the Navy. I agree that the spirit of these men was such that they do want to earn a living. There was no spirit greater than that of our fighting man. In training and leadership he was self-reliant and courageous; he asked no quarter and gave none, and that was his spirit when he became a casualty.

The Medical Department has reorganized its Physical Therapy, Occupational Therapy and Reconditioning Divisions into a Physical Medicine Consultants Division in the Surgeon General's Office, which includes Physical Therapy, Occupational Therapy and Physical Reconditioning. A Physical Medicine Service is being established in each general hospital and to a lesser extent in station hospitals, to include these activities. The Consultants Division in the Surgeon General's Office and each Physical Medicine Service in hospitals will be headed by a medical officer who has specialized in physical medicine (as soon as such officers can be trained).

A bill has been introduced in Congress granting commissions to physical therapy and occupational therapy aides and establishing a Reserve Corps.

Again the Medical Department congratulates this organization and the Baruch Committee for the job it did during the war period which has aided us so greatly in our work, and we are depending on you and ask your help in training individuals and organizing, in order that we can carry on our mission in physical medicine in the peacetime Army.

Address of Howard H. Montgomery, Capt. (MC), U. S. Navy, Medical Officer in Command, U. S. Naval Hospital, Philadelphia. (Formerly Head, Rehabilitation Bureau of Medicine and Surgery, Navy Department).

It was my privilege to discuss the Rehabilitation Program of the Medical Department of the Navy during the meeting of this Congress in Cleveland two years ago. At that time the war was rapidly increasing in intensity and there was every reason to believe that it would be long-drawn out and bitter. It was bitter, but within a year both Germany and Japan had surrendered and actual fighting had ceased. Now, a little more than a year after victory we find the majority of the casualties recovered from their diseases or injuries and returned to their homes. Those more severely injured who remain in the hospitals are rapidly nearing recovery and they are counting the days until they too can return to civil life.

It seems appropriate this evening to review briefly some of the high-lights of significant developments in physical medicine which were evident in the Rehabilitation Program. As was to be expected, the standard procedures of physical therapy were routinely prescribed for the ordinary results of trauma. Physicians both in civil life and in the Navy had been accustomed to referring such cases to the Physical Therapy Department before the war. They continued to do so, but the number of patients referred severely taxed the capacity of even our largest departments. The many severe and complicated injuries, however, imposed treatment problems not encountered in ordinary practice, and the physicians responsible for treatment of these problem cases came to depend more and more on the consultation, advice, and assistance of the medical officer trained in physical medicine. At the same time the surgeons and orthopedists were calling upon physical medicine for assistance in a wider range of cases, the other clinical departments were also turning to physical medicine in many conditions in which treatment by physical agents had seldom been extensively employed.

The hospital staffs as a whole came to recognize the specialist in Physical Medicine as a consultant who could render valuable service in treatment of many of their difficult therapeutic problems, and the problems they presented were a challenge to these specialists, a challenge they readily accepted. As a result, we now see physical medicine established as a separate clinical department in our hospitals.

The demonstrated benefits from early, graduated, active exercise in both surgical and medical patients, particularly the younger and more physically vigorous whose conditions necessitated long periods of confinement to bed, seems another significant development. There appears to be no doubt that patients who participated in this exercise enjoyed an increased sense of well-being; their metabolism improved; recovery from the basic disorder was expedited; and convalescence was shortened. It is true that this program of

directed, systemic exercise was costly in personnel—too costly to be continued on anything like the same scale in time of peace. Its definite therapeutic effects, however, seem to point to the necessity of devising some means whereby this form of treatment can be provided in the cases for which it is particularly indicated. This, logically, is a part of physical medicine.

The contributions of physical medicine in physical rehabilitation of the severely handicapped were possibly the most spectacular of its accomplishments. In the care of the paraplegics, the chief of the physical medicine service worked side by side with the surgeon and urologist. A large proportion of these patients underwent exploration of the spinal canal at the site of injury in the hope of finding sources of pressure on the cord, or adhesions, which might be corrected with some degree of return of function. Results more than justified this procedure. In most cases the inevitable decubitus ulcers eventually required plastic surgery to obtain firm healing. Their paralyzed bladder control in these patients called for very careful attention by the urologists. While these specialists were carrying on their work, the patients were put through a daily routine of graduated exercise of their upper extremities and the muscles of the trunk. It was in these patients that the improved metabolism and very evident increased sense of well-being was probably most marked. From wasted, despondent, pitifully helpless bedfast invalids they changed to happy, alert, determined men with strong arms and hard active thoracic and abdominal muscles. Along with these evident effects of directed activity, it was reported that the urinary excretion of calcium, which was a continuing difficulty in maintaining catheter drainage, diminished until the urine became normally clear. Many of these patients were enabled to achieve bladder control and voluntary emptying by use of their well developed abdominal muscles. When their surgery had been completed and their muscular development permitted, they were furnished leg braces and put through a course of training in self-care and travel which followed the precepts of Dr. George B. Deaver. Some of these patients have been discharged to their homes with well-laid practical plans for study and profitable occupation.

Systematic exercise of the amputation stump and leg as well as the body generally by amputation patients prior to fitting of their artificial limbs put these patients in condition to immediately begin training in the use of the appliances. Since many of them had injuries to the remaining limb, this preliminary training period was the time when special attention was given to corrective measures both in the form of standard physical therapy as well as directed active exercise. That this preliminary training paid big dividends has been repeatedly demonstrated in the comparatively short time required to become proficient in use of the prosthesis by the patient who had been conscientious and fully cooperative as compared with the patient who had lackadaisically taken this work as an unavoidable evil.

Systematic training in the actual use of the prosthesis and successful passing of set tests of accomplishment are required before the patient is considered ready for discharge.

In the Navy's program the major part of the exercise and training of both amputees and paraplegics as well as other patients was conducted by personnel of the physical training group, specialists in physical education functioning under the department of physical medicine. With demobilization of this personnel at the U. S. Naval Hospital, Philadelphia, the physical therapy technicians have been continuing this work for the not inconsiderable number of amputees and other severely handicapped patients, and it is being carried on most successfully. It seems to me that civilian patients who have similar handicaps should have the benefit of the same kind of care and in view of the small number usually encountered in any one hospital, that physical medicine is the logical specialty to provide this service.

I think it is probable that the part played by physical medicine in the Rehabilitation Program will have a carry-over into civilian practice. The invaluable work of the Baruch Committee focused the attention of the profession, both civilian and service, on physical medicine. The many physicians who have returned to civilian practice after serving in naval hospitals have seen physical medicine in operation as one of the clinical services and they have become accustomed to referring patients for consultation and treatment. It seems only to be expected that they will tend to follow the same procedure in their civilian practice.

I cannot let this occasion pass without paying tribute to the members of this Congress who in Navy uniform worked so diligently and faithfully to give the best that physical medicine affords to the many men and women who have passed through the naval hospitals as patients during the past two years and to express sincere appreciation of the assistance of other members of the Congress in supporting and furthering their work.

Address of Donald A. Covalt, M.D., Assistant Medical Director, Medical Rehabilitation and Physical Medicine, Veterans Adimnistration

We in the Veterans Administration are greatly interested in this problem of training for jobs because we have so many thousands of veterans who are handicapped. For them, we are bringing this training for jobs into our hospitals.

We feel that it is just as necessary as giving them adequate medical and surgical care and that it must be a part of our whole rehabilitation program. One example of this is the watchmaking instruction furnished for paraplegias, which General Kirk started in certain of his Army Service Forces hospitals several months before we took them over. In the six paraplegia centers which the Veterans Administration now has, this watch repair course is the activity which interests the patients most. Approximately forty per cent of these men have the manual dexterity and general ability to do this kind of work. We find that it is

necessary to put instructors and teachers on the afternoon and even the night shifts because these men are so anxious to get this instruction while they are still in the hospital.

There is no trouble in getting them to do the work but rather in getting them to stop at the end of the day.

When they leave the hospital, these men may go to the school of watchmaking and repair at Woodside on Long Island to complete their training. It takes a year to make a watch repair man but, for our patients, this time is greatly reduced because they have already completed a portion of the course.

There are many jobs for them. In fact, there now are some eighteen hundred positions which the National Jewelers Association has declared available for these paraplegias.

Two weeks ago here in New York we had a demonstration before one hundred and fifty top national industrialists and business leaders. We demonstrated six paraplegias, one double arm amputee, two double leg amputees and a blind veteran, showing what these men can do. They were able to care for themselves, to dress themselves—and some of them were able to drive their own cars and run complicated machinery.

We had set up certain machinery, including a jig saw and a drill press. The blind veteran demonstrated his ability to sit down at the drill press, make the necessary adjustments and drill steel. In connection with the jig saw, I would like to tell you about a man by the name of Sotto who lives in Brooklyn. A double arm amputee, he operated a complicated jig saw in the exhibit. One of the Vice-Presidents of International Business Machines came up and watched him for a while after we had finished the regular demonstration, and said: I would like to give you a job. Come with me to IBM."

In talking with him, he found that Sotto could speak Spanish. "We need a man like you down in South America."

But Sotto said no. "I want to go to college and get a degree."

The Vice-President walked away and, frankly, he was a little miffed. But in a few seconds he came back.

"You know what? You come with us and I will see that you get a college degree and a job—and you will go to South America for us."

That time, Sotto said "yes."

During the demonstration, we pointed out that the very same courage, the same abilities which enabled these men to lick their disabilities, are the qualities which employers are looking for in their workers.

Many firms have responded. I would like to name a few of them: General Motors, General Electric, Eastman Kodak, International Business Machine, Winchester Arms, and others. All of these firms plan to bring certain selected training right into our own hospitals.

We feel that letting these disabled veterans find out that they can do these jobs—and do them as well as anyone else—will give them the motivation to carry on. Our American veterans of World War II are not content to live on compensation or pension. They want jobs, a chance to earn money. When they become convinced that they can get and hold a job, a major part of the problem is solved.

In addition to production work, many of these nationally known industries plan to train handicapped veterans for service work on their products. In other words, when a veteran leaves the hospital, he will be able to return to his own community and there set up his own repair shop and take care of the servicing of refrigerators, clocks, typewriters, guns or whatever other special work he has trained for.

One other interesting project which developed following our demonstration involved the president of the largest diamond syndicate in America. He said, "For the past six years, we have been unable to train any apprentices to cut and polish diamonds. I think this would be a natural for certain men with disabilities, for in this work, the men come to their benches in the morning, stay until noon, have lunch and come back for the afternoon. The work is all done with the hands. I would like to put this training into your hospitals, for there is a shortage of men in this type of work."

I agreed enthusiastically but I had one question. "What will you use to train them? Are you going to bring diamonds into our hospitals? I am concerned for the safety of the diamonds; I don't doubt our patients—but I'm not so sure about us doctors."

He laughingly assured me that glass would be used, and that all apprentices in this work learn on glass. So we plan to add this special skill to our hospital program.

For those of you who are fishermen, I think you might be interested in a fly-tying project that we started in Albuquerque some months ago. It was sort of a minor project. Nobody paid a whole lot of attention to it. As interest in the project developed, some of the patients began to sell the flies.

Two things happened. First, we hired back two of the former patients as instructors to teach the increasing number of patients who were interested, and they are still employed in this work. Secondly, a group of patients, on discharge from the hospital, formed their own corporation and are making and selling the flies throughout the country.

I had a letter from the president of the company, a former patient, and he said that they have started selling direct and now are making twice as much money as before.

Recently we received the green light, I might say, to start our first convalescent hospital. It will be located at Fort Thomas, Kentucky, across the river from Cincinnati, Ohio, and is the site of a former Army Air Forces Convalescent Hospital. Here we want to bring in the severely injured veterans, those who may not be rehabili-

tated by ordinary procedures in an acute definitive hospital. The Rehabilitation Boards in our acute hospitals will carefully select these men and send them to the convalescent hospitals. We may find it necessary to establish one such hospital for each of our areas.

Here, the severely handicapped veteran may have to spend two months or two years—but the time it takes is not as important as the eventual results in terms of successful rehabilitation, physiologic, psychologic, social and economic.

In our plans, we have included a new Rehabilitation Center, a model project to be built from the ground up. We hope to include two to three hundred acres of land so that we may include farming. We expect to provide ideal living conditions for disabled veterans there, to bring in specially selected job training, and to establish a complete sheltered work shop. When this plan becomes a reality, many of you who are here tonight will be called on for ideas and advice. Rehabilitation has made tremendous progress in the last five years but there is a great need, we feel, for further research and advancement. We who are in Physical Medicine and Rehabilitation have a big job to do and we must give our best efforts. We must use every bit of our knowledge and labor unceasingly in order that our finished product is not a patient but a self-sufficient citizen. Thank you.

Effects of Extreme Cold Studied by Surgeon General's Office

Extreme or prolonged cold tends to clot red blood cells so that they plug the circulation, which eventually results in development of gangrene and loss of limbs. This has been established, it was reported by the Surgeon General's office, both by careful study of pathologic tissue from overseas soldiers and experiments with rabbits in which limbs were subjected to temperatures of minus 30 C.

The condition became of great importance in the European Theatre during the last war. It was most dramatically exemplified among air crews subjected to the extreme temperatures four or five miles over the clouds. Even as exposure of a minute or so might result in the loss of a finger.

It was one of the chief causes of casualties in the Apennines campaign of the winter of 1943-44. Infantrymen sometimes stayed days at a time in fox-holes filled with slush and ice-cold water. When they were relieved they would be unable to walk and were in almost unbearable pain. Often this persisted for weeks after treatment and loss of toes was not infrequent.

The condition was one in which there had been little previous experience and its pathology was not understood.

A report on the samples of pathological tissue has just been made by Major Nathan B. Friedman of the Army Institute of Pathology. Several varying effects of cold were noted but in all cases were found the red blood cell "plugs" which had stopped the circulation and prevented its restoration. Hence part of a limb would lose its blood supply and gangrene would be the almost inevitable result.

The same condition could be produced in the rabbit limbs immersed half an hour in alcohol at minus 30. This was a far more severe exposure than a soldier ever would be likely to encounter.

The clotting could be prevented in the rabbits, however, by injections of an anti-clotting substance known as heparin. Treated rabbits seemed little the worse off when their legs were thawed.

Dr. Neymann to Receive Honor From Ghent University

CLARENCE NEYMANN, M.D.

Because of his work in artificial fever therapy produced by high frequency currents, Dr. Clarence Neymann, of Chicago, on October 14, will have bestowed on him by the University of Ghent the Degree of Doctor of Medicine *honoris causa*.

Dr. Neymann, who was born in Chicago in 1887, received the A.B. degree from Harvard University in 1909 and the degree of M.D. from Heidelberg in 1914. Many other honors have been earned by Dr. Neymann, who, in addition to being attending psychiatrist at Wesley Memorial Hospital in Chicago, is Chief of the Staff of Cook County (Illinois) Psychopathic Hospital, and is associate professor of psychiatry, Northwestern

University Medical School. Among these honors are: member, Royal Society of Medicine, London, England; honorary professor of medicine, National University of Mexico, Mexico, D. F.; honorary membership, Medical Society of Yucatan; exchange professor, Universities of Liège, Brussels, Louvain, and Ghent under the auspices of the Belgian-American Educational Foundation. Dr. Neymann is a member of the Belgian Legion of Honor, Officer of the Crown. He is the first American physician to receive an honorary degree from Ghent University.

New Appointment for Harold Dinken

Dr. Harold Dinken, Port Chester, N. Y., who since 1945 has been studying physical medicine at New York University College of Medicine on a fellowship of the Baruch Committee for Physical Medicine, has been appointed assistant professor of medicine and head of the division of physical medicine at the University of Colorado School of Medicine, Denver.

Hospitals Approved for Residency Training in Physical Medicine

[1]Los Angeles County Hospital, Los Angeles.
[1]Massachusetts General Hospital, Boston.
Mayo Foundation, Rochester, Minnesota.
Michael Reese Hospital, Chicago.
[1]Montefiore Hospital for Chronic Diseases, New York City.
[1]Mount Sinai Hospital New York City.
Passavant Memorial Hospital, Chicago.
[1]Presbyterian Hospital, New York City.
St. Luke's Hospital, New York City.
Stanford University Hospitals, San Francisco.
[1]State of Wisconsin General Hospital, Madison, Wisconsin.
[1]University of California Hospital, San Francisco.
[1]University Hospitals, Minneapolis, Minnesota.
Walter Reed General Hospital, Washington, D. C.
University of Kansas Hospital, Kansas City, Kansas.
[1]Goldwater Memorial Hospital, New York City.
[1]Hospital for Joint Diseases, New York City.
[1]Cleveland Clinic Foundation, Cleveland, Ohio.
[1]Hospital of the University of Pennsylvania, Philadelphia.
[1]Medical College of Virginia, Hosp. Div., Richmond, Va.

1. Indicates temporary approval.

Colonel Rufus L. Holt to Succeed Brigadier General Callender

Col. Rufus L. Holt, formerly acting commandant and secretary of the professional service school of the Army Medical Department, was recently appointed commandant to succeed Brig. Gen. George E. Callander, who recently retired after thirty-three years of service.

Donald Covalt Honored

The War Department has announced the award of the Legion of Merit to Lieut. Colonel Donald A. Covalt, Medical Corps, with the following citation:

As Convalescent Training Officer, Army Air Forces Station Hospital, Miami Beach Training Base and, later, as Executive Officer of the Convalescent Services Program, Office of the Air Surgeon, from April, 1943 to November, 1945, he rendered outstanding service of tremendous value to the Army Air Forces Medical Department and the military service at large. The Convalescent Services Program which Colonel Covalt organized and directed became a model for the Army Air Forces and the experience of this project was utilized by other branches of the service and by the military service of our Allied Nations.

Lieutenant Colonel Frank E. Hamilton Heads Walter Reed Hospital Staff

Brigadier Gen. George C. Beach, Jr., commandant of Walter Reed Medical Center, announces that Lieut. Col. Frank E. Hamilton of Columbus, Ohio, has been named chief of staff of Walter Reed General Hospital here, succeeding Col. Reed Bowers of Frederick, Md., who is returning to inactive duty to resume teaching at Cornell University Medical College. Colonel Hamilton is a former assistant professor of surgery at Ohio State University College of Medicine and is a veteran of the Normandy campaign.

Charles Brown New Dean of Hahnemann Medical College

Dr. Charles L. Brown, professor of medicine, Temple University School of Medicine, head of the department of medicine at Temple University Hospital and chief of the division of medicine at Philadelphia General Hospital, has been appointed dean of Hahnemann Medical College and Hospital of Philadelphia, effective September 1. Dr. Brown graduated at the University of Oklahoma School of Medicine, Oklahoma City, in 1921. He is a past-president of the Philadelphia County Medical Society and of the Washtenaw County (Mich.) Medical Society.

President Truman Lauds Work of American Federation of the Physically Handicapped

President Truman declared in a letter to the third biennial convention of the American Federation of the Physically Handicapped that the government and industry alike are obligated to help the nation's 1,500,000 handicapped persons to live normal, self-supporting lives. Mr. Truman said he was deeply impressed with statistics on the handicapped. The convention was urged to make long-range plans to get a fair share of the 60,000,000 jobs, and October 6 was named National Employ the Physically Handicapped Week.

Paul A. Strachan was reelected president; Ralph Collins, treasurer, and Mildred Scott, secretary.

Department of Illustration Created

A department of illustration was opened about September 1 at Washington University School of Medicine St. Louis under the direction of K. Carmer Lewis. Mr. Lewis, who has been a professional photographer for nine years, was formerly with the photographic department at the State University of Iowa, Iowa City. The department of illustration will offer a complete medical photographic service, including clinical photography, photomicrography and motion pictures.

Physical Medicine at Walter Reed

Brigadier General George C. Beach, commanding officer of the Army Medical Center in Washington announced on July 8 the establishment of a new department of physical medicine at Walter Reed Hospital. The new service, under the direction of Captain George W. Soffe, Medical Corps, will combine physical therapy, physical and educational reconditioning and occupational therapy.

Ernest Hartwell Heads Cerebral Palsy Commission

Ernest C. Hartwell, M.A., retired president of the Brockport State Teachers College, Brockport, N. Y., has been appointed executive secretary of the Joint Legislative Commission to Investigate Cerebral Palsy, it was announced August 16. The commission is operating under a $20,000 appropriation by the legislature and will make a survey and study of the social, educational and physical problems of persons afflicted with cerebral palsy in the state of New York.

General Motors Medical Conference

General Motors sponsored a two day medical conference in Rochester, N. Y., July 29 to August 2. Among the speakers was Dr. Vincent T. Williams, Kansas City, Mo., who presented a paper on "Wound Healing and Early Ambulation."

Seventh Brazilian Congress of Orthopedics and Traumatology

The seventh annual meeting of the Brazilian Association of Orthopedics and Traumatology was held recently at Rio de Janeiro. An entire session was devoted to war traumatology, including a general report by Col. Marques Porto, head of the medical service of the Brazilian expeditionary force in Italy.

Congress on Industrial Health

The Seventh Annual Congress on Industrial Health, sponsored by the Massachusetts Medical Society, Council of the New England State Medical Societies and the Council on Industrial Health of the American Medical Association, was held in Boston from September 30 to October 2. The Surgical Conference on Monday afternoon, September 30, was devoted to the problem of the injured foot. The following program was presented:

Examination and Anatomy—Robert J. Joplin, Boston.

Diseases That Retard Healing of the Feet— Leland McKittrick, Boston.

Fractures of the Foot—Joseph S. Barr, Instructor in Orthopedic Surgery, Harvard Medical School, Visiting Orthopedic Surgeon, Massachusetts General Hospital, Boston.

Fractures of the Ankle—Clay Ray Murray, Professor of Orthopedic Surgery, Columbia University College of Physicians and Surgeons, New York.

Proper Shoes and Shoeing—Frank R. Ober, Professor of Orthopedic Surgery, Harvard Medical School, Boston.

Physiatrists Urgently Needed in Veterans Administration

Physicians in the specialty of Physical Medicine are urgently needed in the Veterans Administration for assignment to hospitals, regional offices and sub-regional offices throughout the country, Dr. Paul R. Hawley, Chief Medical Director in the Department of Medicine and Surgery of VA reveaied. VA offers qualified physicians an opportunity to practice as well as facilities for training, teaching and research in the field of physical medicine.

Physical medicine physicians serving with VA will be in charge of physical therapy, occupational therapy and corrective physical exercises, which will be coordinated with activities for educational retraining, shop retraining, aural rehabilitation and industrial therapy.

Although overtime pay is not provided by law for physicians in the Department of Medicine and Surgery, such work is compensated by higher initial pay, liberal promotion and leave policies and opportunities to obtain postgraduate instruction.

Applications should be submitted to a VA branch office or to the VA Regional office or hospital where appointment is desired. Positions will be offered in the grade commensurate with the training and experience in the field of physical medicine.

For additional data concerning appointment in The Physical Medicine Division a communication should be addressed to the Assistant Medical Director for Medical Rehabilitation, Veterans Administration, Washington 25, D. C.

Grafton B. Day

We regreat to announce the death in Collingswood, New Jersey, of Dr. Grafton B. Day, a long time member of the American Congress of Physical Medicine.

BOOK REVIEWS

THE TRAUMATIC DEFORMITIES AND DISABILITIES OF THE UPPER EXTREMITY. By *Arthur Steindler,* M.D., F.A.C.S., Professor and Head of the Department of Orthopedic Surgery, The State University of Iowa, in collaboration with *John Louis Marxer,* M.D., Associate, Orthopedic Department, The State University of Iowa. Cloth. Pp. 515, with 1048 illustrations. Price, $10.00. Springfield, Illinois: Charles C. Thomas, 1946.

This is a scholarly and valuable exposition on the subject of an important aspect of medical practice, namely, disabilities of the upper extremities. Students and teachers will appreciate the introductory section dealing with important physiologic and physical aspects of muscular action, as well as other general principles of the treatment of deformities. Mechanical methods of overcoming contractures are dealt with in considerable detail, and the fundamental principles of abnormal physiology in relation to traumatic lesions are clearly demonstrated. "Physiotherapy" is described in general terms and emphasized as an important adjunct in treatment.

Following the introductory section the separate regions of the upper extremity are discussed. A valuable part of this presentation is the emphasis placed on the leverage effects of muscle groups acting on the specific joints. To visualize this point diagrammatic sketches are shown. The illustrations are profuse and excellent. Instead of didactic statements, case reports are given as substantial evidence of the authors' statements. This makes the book particularly interesting reading and in the reviewer's opinion an excellent teaching medium. The literature is quoted, not in entirety, but with well selected references which are up to date. This book is highly recommended as a reference for surgeons and specialists in physical medicine as well as for students including physical and occupational therapists. It should not be considered, however, as an elementary text as many unusual cases are described, but its value is probably more increased than lessened by this fact.

MEDICINE IN INDUSTRY. By *Bernhard J. Stern,* Ph.D., Lecturer in Sociology, Columbia University; Visiting Professor of Sociology, Yale University. Cloth. Price, $1.50. Pp. 209. New York: The Commonwealth Fund, 1946.

This study shows that industrialization has raised the standard of living of great masses of people, with resultant improvements in health, but it has brought new health and medical problems. It shows that it has created an environment in which previously unknown diseases have been engendered and old diseases have been modified. It has exposed workers to toxic agents and dusts, to damp, poorly ventilated and inadequately illuminated workshops, and to processes that are often fatiguing and hazardous. It has therefore created new fields of medical research and practice.

The author traces in broad perspectives the social, economic, legal and professional setting within which industrial medicine has progressed, and the development of the scientific knowledge which has enabled industrial physicians to cope with diseases affected by occupations. He presents data on the rates of industrial disability and the limited extent of preventive services. The recent developments in health and insurance programs, the problems of the handicapped in industry and the relation between the industrial physician and the general practitioner are discussed. This study shows that, although great advances have been made in recent years, adequate medical care for the mass of workers in the United States is still to be provided and that industrial medicine offers a fruitful approach to preventive medicine and public health.

This book should be read by the industrial physician and all insurance officials who work in industrial medicine because it gives the points of view of a sociologist on this important field in medicine.

HIPPOCRATIC WISDOM FOR HIM WHO WISHES TO PURSUE PROPERLY THE SCIENCE OF MEDICINE: A MODERN APPRECIATION OF ANCIENT SCIENTIFIC ACHIEVEMENT. By *William F. Petersen,* M.D. Fabrikoid. Price, $5.00. Pp. 263 with illustrations. Springfield, Illinois: Charles C. Thomas, 1946.

The author of this stimulating volume holds that today, as never before, knowledge of the historical continuity of the tradition that combines theory and practice is indispensable. The pace of medical education has become more swift, the content more complex, the mental diet more and more monotonous as the inspiring era of the great clinical teachers has passed. It has been evident that the student is often so overwhelmed by the surfeit of objective information that he is unable to use it properly as building material for a well integrated and organized structure. With all this, the acquired confidence in the significance of detailed skills becomes so exalted that the student is apt to consider technical dexterity as the equivalent of medical wisdom. It is the purpose of this book to bridge this chasm by making evident how medical wisdom could be achieved on the basis of accurate clinical observation. When synthesized with broad experience, that essential attribute of genius which we term intuition can evolve. The Hippocratic values in medical training may be summed up in a word: The physician must have; first, intimate, habitual, intuitive fa-

miliarity with things; secondly, systematic knowledge of things; and thirdly, an effective way of thinking about things. The so-called genuine works of Hippocrates reveal a method in the exploitation of everyday experiences with the lives and deaths of men that can never be too carefully studied. As one reads through the successive chapters on "Poles of the Earth, Season and Erysipelas," on "Anoxia," on "Epilepsy and Hydrophobia," on "The Medical Clinic," on "Art and Practice of Surgery" on "The Cosmic Concept," etc., one is impressed by the acuteness of observation of the early Greeks and the clarity of their deductions. The author has rendered a real service by presenting this volume and it is indeed one which every practicing physician should read with profit.

THE SULPHONAMIDES IN THEORY AND PRACTICE. By *J. Stewart Lawrence,* M.D. (ED.), M.R.P. Physicians, Haymeads Emergency Hospital, Bishop's Stortford. Cloth. Pp. 125. Price, 9s. London: H. K. Lewis & Co., Ltd., 1946.

This is a condensed survey of the sulphonamide drugs presented in eleven short chapters. Nothing new has been added to the subject which is admitted by the author. The material for the most part has been taken from the American Medical literature. The shortcomings of both the sulphonamide drugs and penicillin are discussed. The book is presented simply and easily read. Although this monograph does not present material that can be considered monumental to the medical literature, it is of interest to those physicians who have not recently reviewed this subject. It further brings attention to the fact that since the penicillin era, the sulphonamide drugs have not been entirely outmoded. They still have an important place in the chemotherapeutic armamentarium. This review may be some help to the busy general practitioner who wishes quickly to acquaint himself with the various sulphonamide drugs, their action, therapeutic indications and contraindications.

ANALYZE YOURSELF: ENABLING ANYONE TO BECOME DEEPLY PSYCHO-ANALYZED WITHOUT PERSONAL ANALYST. By *E. Pickworth Farrow,* M.A., D.Sc. With a foreword by the late Professor Sigmund Freud, M.D., LL.D. Second edition. Cloth. Price, $2.00. Pp. 157. New York: International Universities Press, Inc., 1946.

This book offers a full and detailed account of how to follow a practical method of the psychoanalysis of one's own mind, with some results from early childhood obtained by pursuing it in the author's own case. The school of Freud asserts that non-analytical psychology scratches about on the surface of the mind leaving all the deeper origins of the conscious thoughts and reactions permanently hidden from examination. These deeper origins are far more important causally than the specific conscious thoughts themselves. The analytic process should give one much interesting information concerning the extremely complicated and intertwined working of the thought processes in the adult human mind and enables one to understand his own mind, as well as those of other people, far better than before. It was the intention of the author that this little volume be readily understandable by anybody with no previous knowledge whatever of the subject. The book is undoubtedly fresher and more stimulating than orthodox psychoanalytic manuals and is a definite contribution to psychologic literature.

A REPORT ON THE READJUSTMENT IN CIVIL LIFE OF SOLDIERS DISCHARGED FROM THE ARMY ON ACCOUNT OF NEUROSIS. By *Eric Guttman,* M.D., M.R.C.P. and *Elsie L. Thomas.* Paper. Price, 40c. Pp. 70. London. His Majesty's Stationery Office, 1946.

A psychiatric social worker was sent out to various sections of England, industrial and rural to investigate 382 British soldiers who were discharged during a period from Jan. 1, 1943 to Mar. 31, 1943. She secured information as to amount of time lost before the discharged neurotic secured employment, how often he changed his position, his earnings before and after his army service, health record, adjustment to family, etc. The results of this survey are summarized in 60 tables and four diagrams and 43 pages of discussion. No doubt this work will be useful to social workers and to some psychiatrists, however, the entire effort reminds this reviewer of the definition of a statistician "a person who goes directly from unwarranted assumption to a preconceived conclusion."

SYNOPSIS OF GENITOURINARY DISEASES. By *Austin I. Dodson,* M.D., F.A.S.C., Richmond, Virginia. Professor of Genitourinary Surgery, Medical College of Virginia; Genitourinary Surgeon to Crippled Children's Hospital; Urologist to St. Elizabeth's Hospital; Urologist to St. Luke's Hospital and McGuire Clinic. Fourth Edition. Leather. Price, $3.50. Pp. 313 with 112 illustrations. St. Louis: The C. V. Mosby Company, 1945.

Notable advances in chemotherapy and endocrinology have been added to the fourth edition of this book for students and physicians desiring a synopsis of genito-urinary diseases.

Chapter 1 is a summary of the most prominent signs and symptoms of urogenital diseases, and of laboratory and physical examinations. In chapter 2 instruments needed in general practice and their use are described; there is a discussion of the diagnosis and treatment of minor conditions. Succeeding chapters concern the anatomy of the urogenital tract and congenital anomalies. Ten chapters are arranged largely according to the causation of the important conditions in this field

The liberal use of line drawings is to be highly commended, although a few of them are so diagrammatic that it is difficult to see exactly what they contribute to the reader's understanding of the problem. However, the new halftones are excellent and most of the pen-and-ink sketches are very good. The author has reviewed and epitomized urogenital diseases for the student and

busy clinician, and has avoided extensive references to the literature and to controversial problems. He has written in a clear and concise manner.

The book is recommended to those interested in the practical aspects involved in the diagnosis and treatment of genito-urinary diseases.

EXERCISES IN HUMAN PHYSIOLOGY (Preparatory to Clinical Work). By Sir *Thomas Lewis*, C.B.E., F.R.S., M.D., D.S.C., LL.D., F.R.C.P. Physician in Charge of Department of Clinical Research, University College Hospital, London; Honorary Consulting Physician to the Ministry of Pensions; Consulting Physician, City of London Hospital; Fellow of University College, London. Cloth. Price, $1.25. Pp. 103. New York: The Macmillan Company, 1945.

Mastery of the laboratory exercises in human physiology presented in this book would help to bridge the abrupt gap between the preclinical and clinical application of physiologic principle Generally this is difficult to do. This small monograph presents valuable material for the student, material which ordinarily is not available in larger works on physiology, such as Haldane's and those of his disciples, or Lythgoe's. In brief, experiments are described to be carried out in the classroom or laboratory, where small groups may perform instructive exercises which a master clinician has chosen because the procedures have been found to be valuable in clinical work. The experiments described are highlighted by a short discussion of their clinical application. The material presented also is a preliminary guide to good clinical investigation.

There are more than sixty exercises described under thirty-three headings, such as blood pressure, erythralgia, electrocardiography, and cutaneous and vascular and functional responses to various tests. The volume is interestingly and well written, and can be highly recommended for classroom work.

A B C OF MEDICAL TREATMENT. By *E. Noble Chamberlain*, M.D., M.Sc., F.R.C.P. Lecturer in Medicine, University of Liverpool; Physician to Out Patients, Royal Infirmary, Liverpool; Visiting Physician, Smithdown Road Hospital; Formerly Beit Memorial Fellow. Cloth. Price, $3.00. Pp. 206. London, New York, Toronto: Humphrey Milford, Oxford University Press, 1946.

The less said about this work the better. It is written for British practitioners but it is almost incredible to believe that physicians there in the year 1946 would follow the suggestions. The errors are colossal, the alphabetical arrangement of diseases, treatments, symptoms, etc., is hopeless and the appendix of 56 pages on diets separating them into war time and post-war time diets is really humorous.

FOOT DIMENSIONS OF SOLDIERS: PROJECT NO. T-13, SURVEY OF FOOT MEASUREMENTS OF PROPER FIT OF ARMY SHOES. (Third Partial Report.) Paper. Pp. 164 with 121 illustrations and graphs. Fort Knox, Kentucky. Armored Medical Research Laboratory, 1946.

The average enlisted man in this war if asked about his shoes would likely reply "too large or too small." Of course, this was not true for the American soldier of World War II was the best fitted and the most adequately equipped soldier particularly as to foot gear of any soldier of any time. This work analyzes 27 foot dimensions of thousands of white and colored soldiers who were processed through Fort Knox. It includes such features as toe length, anterior curvature and orientation of toes, ball height, heel breath, lower leg girth, etc., etc. There is a vast amount of practical material which should be valuable not only to the army but to the civilian shoe manufacture as well.

PHYSICAL MEDICINE ABSTRACTS

Blueprint for an Important Service Physical and Occupational Therapy. William Benham Snow.

Mod. Hosp. **66**:65 (June) 1946.

The department of physical and occupational therapy should have as its director a physician who has certain personal attributes and professional qualifications. The attending physician in physical medicine should have an understanding resident to carry on in his absence and to cover adequately the follow-up of his cases. A gap at this point often results in the therapist in charge advising attending physicians on treatment prescriptions or actually prescribing for patients himself. Head therapists should be senior members of the department who are thoroughly acquainted with the routines of the institution and who understand the director of the department. Preferably, they should have risen from the ranks.

Treatment and Rehabilitation of Men With Damage of the Brain. Part I. John A. Aita.

Proc. Staff Meet., Mayo Clin. **21**:257 (July 10) 1946.

The requisites of a program of rehabilitation are careful psychologic testing; psychosomatic orientation, Red Cross social service information; a special reconditioning and reeducational program under the supervision of one man; earlier interest of the separation classification officer who is the employment specialist; careful formulation of data concerning the patient and explanation to the patient of what rehabilitation he may expect; contact with patient's relatives; therapeutic trials at home.

Supervised physical therapy includes exercise and activity in the gymnasium. The medical officer should maintain regular check on physical therapy, exercise and activities. Progressive management and the patient's active participation must be sought. At least once a month a careful objective study of the amount of weakness and spasticity of all involved muscles should be made and recorded.

Occupational therapy which is taught in a special class for the group to aid in retraining of muscular skills and to give the patient a daily sense of accomplishment. Mental as well as physical stimulation is sought.

Traumatic Rupture of Adductor Muscles of Thigh. G. Crile, Jr.

U. S. Nav. M. Bull. **46**:719 (May) 1946.

Crile says that in the past year 3 so-called hernias of the adductor muscles of the thigh have been seen at the U. S. Naval Hospital, San Diego. A muscle hernia retracts when the muscle is tensed and bulges when the muscle is relaxed. But in the so-called adductor muscle hernia the opposite is true. The bulge is not obvious when the muscle is relaxed and appears only when the adductor muscles of the thigh are tensed. The so-called adductor muscle hernia is not a hernia at all but is a ruptured muscle. Trauma causes a rupture of the belly of one or more of the muscles of the adductor group. The ends of these muscles retract. The upper end of the muscle retains its innervation and continues to function, but it is torn loose from its insertion and it therefore contracts into a thick mass on the upper inner aspect of the thigh. This mass disappears when the muscle is relaxed and reappears when it is contracted. Pain and weakness of the affected thigh are common complaints. Correction of this deformity cannot be accomplished by repair of a supposed defect in the fascia. In early cases it is possible that good results could be obtained by repair of the ruptured muscle, but in late cases atrophy, contraction and fibrosis make it impossible to effect a satisfactory repair. Conservative treatment and reassurance are recommended for patients with ruptured adductor muscles. If the presence of the mass is of cosmetic importance it can be excised, but the symptoms may not be relieved.

The Modern Basement Workshop Pictured as Means of Release. John A. Howland.

Med. World **64**:203 (May) 1946.

The home workshop movement has spread all over the country. One reason is the millions of Americans of both sexes and all ages who have learned to use tools and machinery in war trade schools and war production plants. Another is the improvement made in today's wood and plastics working machinery and hand tools; machines are more versatile, safer to use, make less noise in the home and are lighter. Still another is the continued shortage of useful articles of wood, metals, plastics many of which the amateur can supply for himself or produce at a profit with even a small modern shop.

Traumatic Ossifying Myositis. C. Howard.

U. S. Nav. M. Bull. **46**:724 (May) 1946.

Various theories have been advanced to explain the development of these localized bone growths. In cases reported by the author the areas were all in contact with bone. This would favor the theory of a periosteal injury with escape of osteogenic cells from the periosteum. Four cases of myositis ossificans were found following football injuries and 1 case following an injury incurred while playing soccer. Therapy for these cases consisted in prompt application of an ice pack. A roentgenogram was taken to rule out fracture. On

the following day heat treatment was begun, with a fifteen minute immersion in the whirlpool bath followed by a short wave treatment. These treatments were given twice daily for the first week. If the mass did not absorb within ten days or two weeks, a second x-ray examination usually revealed some soft tissue calcification. Heat therapy was continued when this condition was found and serial x-ray films were taken to check on the progress of ossification. These serial films showed a progressive increase in density of the calcification and a gradual reduction in size. Two cases were followed up for six months. None of these cases showed a complete disappearance of the ossification.

Temperature and Blood Flow in the Human Forearm. H. Barcroft, and O. G. Edholm.

J. Physiol. **104**:366 (April 15) 1946.

The temperature conditions and the rate of blood flow in the human forearm can be affected by alteration of the external temperature, in particular when the forearm is immersed in water at different temperatures.

The data presented enable a more rational choice of water-bath temperature to be made by comparing the temperature of the skin, subcutaneous tissue and muscle, and the blood flow of the whole forearm, in the clothed forearm and when the arm is immersed in water at different temperatures.

The opportunity has also been taken to measure the forearm temperature while the uncovered limb was (1) cooling in air and (2) immersed in water at different temperatures.

Prolonged Electroconvulsive Therapy. G. J. Gordon, and M. B. Zimbler.

Delaware State M. J. **18**:125 (June) 1946.

The application of prolonged electroconvulsive therapy to chronic patients was dictated as an emergency measure under difficult circumstances, yet there are many reasons why this method is going to stay. The risk of regression is too serious in many instances of chronic psychosis to stand by idle or to rely on conservative regimes which, more often than not, give little satisfaction to the patient and no encouragement to the physician. There are still too many unknown factors about the basic principles involved in this method and it is sincerely felt that it is still in the stage in which the experimental attitude of the therapist is an asset.

The authors believe that electroshock therapy can and should be expanded to such chronic cases in which a tendency to intermittent or periodic exacerbations exists. There is ample justification in such procedure, and the following points deserve serious consideration:

(1) Resistance to therapy of one or the other form has been established on previous experience, or

(2) At times, the patient is admitted for further treatment after several previous therapeutic endeavors in the acute phase have failed.

(3) Physical impairment due to unfavorable attitudes of the patients can be forestalled (poor food intake, refusal to eat, need for tube feedings, or parenteral fluid administration).

(4) Sedative therapy cannot be pushed beyond the critical level, and overdosage can be easily avoided.

(5) Violent outbursts can be more readily held in abeyance while the actual risks to life and property are reduced to a minimum.

(6) Mechanical restraints can be limited or entirely abandoned.

(7) There is still the potential element of unexpected gains.

(8) No evidence of permanent impairment of mental faculties as a result of prolonged treatment has been adduced and there was not a serious accident among the large group of chronic patients thus treated.

Fluids in Congestive Heart Failure. Carroll Moton Leevy; John A. Strazza, and Abraham E. Jaffin.

J. A. M. A. **131**:1120 (Aug.) 1946.

Essential therapy in congestive heart failure is the judicious employment of bed rest, digitalis, diuretics and sedatives, with an acid ash salt poor diet providing sufficient calories, minerals and vitamins. With restricted sodium intake, restriction of water is unnecessary in treating cardiac decompensation, increases the discomfort of the patient and may prove deleterious. In most decompensated cardiac patients forcing fluids will neither retard nor facilitate compensation. When congestive failure is complicated by sepsis requiring chemotherapy, azotemia or dehydration in associated medical or surgical conditions, fluids should be forced to obtain optimum therapeutic results. As in health, the average patient with congestive heart failure should be allowed to drink water as it is desired, consuming enough to maintain a daily minimum urinary output. Water intake should be increased to prevent dehydration where there is intrinsically impaired renal function, sepsis, excessive skin or urinary water loss.

Observations on the Value of Electromyography in Lesions Involving the Lower Motor Neurone in Man. Graham Weddell.

Proc. Roy. Soc. Med. **39**:339 (April) 1946.

In lesions where there is either destruction of the whole lower motor neurone, or degeneration of its axon, fibrillation action potentials can be recorded from the denervated muscle fibers. It is this characteristic change in the electrical activity of the muscle that can be used to distinguish between degenerative lesions of the lower motor neurone and affections in which the integrity of the neurone is preserved although the axon is temporarily incapable of conducting nervous impulses. For instance, in cases of facial paralysis, it has been possible to differentiate by observing the presence or absence of fibrillation action potentials, between cases of Bell's palsy and those

involving more severe damage to the facial nerve. Similarly, in certain cases of sciatica with muscle weakness and wasting, evidence has been obtained that the nerve has been destroyed. In such cases, the prognosis is not so favorable as in those in which no fibrillation action potentials can be recorded.

In peripheral nerve lesions, it is not claimed that electromyography should replace tests based on the electrically induced activity of muscles but that electromyography affords a more delicate means of assessing the condition of the motor nerve. It can detect minimal degrees of lower motor neurone denervation and the earliest stages of muscle reinnervation.

Ocular Effects of Radiant Energy. Charles F. Kutscher.

Indus. Med. 15:311 (May) 1946.

Light in passing from one medium to another undergoes one or more of the following changes: It is reflected; it is absorbed or it is transmitted. In general all three changes occur in varying degree.

The cornea reacts promptly to exposure to excessive doses of this group. Pain is immediate and severe. The natural physiologic impulse is to shut the eyes, thus clinical cases of burned corneas from this cause are exceedingly rare. When these cases present themselves the entire cornea is opaque and edematous. The anterior surface though lustreless is rather smooth. The conjunctiva promptly becomes swollen and red.

Following exposures from the radiations emanating from heated surfaces characteristic opacities develop within the lens and its capsule. While the term "glass blowers' cataract" is applied to this lesion, it is a misnomer.

The long radiations of the ultraviolet group on absorption produce a thermal effect. Abiotic activity does not become apparent until about 3200 angstroms and is most pronounced in radiations between 3000 and 2500 angstroms. A critical threshold exists within the tissue both for intensity and wavelength.

From a clinical standpoint the major effect of these radiations is seen in the cornea. With more intensive exposures the epithelium in the central region will be destroyed with the severity of the reaction subsiding as the limbus is approached. The rate of repair depends on the severity of exposure. Even in the most acute cases the height of the reaction occurs within forty-eight hours with complete restoration, and usually with no ill effects in a matter of a week or ten days. It is of interest to note that in the thermal burn the cornea reacts throughout its entire area with the greatest effect in the posterior region, whereas with ultraviolet the reaction is most intense in the central region of the anterior surface. Lens changes resulting from ultraviolet are extremely rare. In an eye with the lens removed the retina may be damaged by these rays.

Finger Amputations. G. J. Curry.

Am. J. Surg. 72:40 (July) 1946.

The several functions of a hand are described as tactile sense, pick up, grip and hook. When amputations are to be done, these several functions should be considered. The occupation of the person should be taken into consideration when decision for amputation is made. A skilled artisan needs tactile sense and pick up. The common laborer needs grip and hook. Tactile sense is obviously lost with finger amputations, as this function is associated with the finger tips. The thumb is the most important digit of the hand, and it enters into part of all the functions of the hand. When it is the seat of any indication for amputation, a careful appraisal of the amount to be removed should be made. Maintenance of pick up function preserves a means by which skilled artisans may carry on. The index finger, ring, fourth and fifth fingers are named in order of their importance to preserve this important function in combination with the thumb. The ideal pick up is by use of the thumb and index finger. The remaining fingers enter into this function in order of their location, as mentioned.

Grip or grasp is the most important function of the hand, with pick up in second place. The former involves the firm coordinated use of the intrinsic and extrinsic muscles. The latter calls for their delicate and dextrous action. Grip or grasp is essential to the heavy duty laborer. Pick-up is necessary for the skilled artisan. Both functions overlap in their importance. Absence of the thumb at the carpal-metacarpal joint leaves a hand with finger grip alone. This is a weak hand. Preservation of a portion of the first metacarpal helps. The metacarpal phalangeal joints should never be sacrificed unless all efforts at satisfactory preservation of function fails. The knuckle line should be preserved, if possible, as this aids grip. If amputation of all fingers is under consideration, short finger stumps will maintain the knuckle line. One should constantly bear in mind the saving of as much as possible.

Mechanical Excitability of Regenerating Nerve-Fibers. J. Konorski, and L. Lubinska.

Lancet 6400:609 (April 27) 1946.

Freshly regenerated nerve fibers exhibit a greatly increased sensitivity to mechanical stimulation. The thresholds of excitation of regenerated sensory fibers in mammals are a few ergs, compared with some hundreds or thousands of ergs in normal nerves. With electrical stimulation the opposite relations appear, the highest thresholds being observed in the youngest parts of the fiber, and the lowest in the normal part. The mechanical excitability falls progressively with the ageing of regenerated fibers. The increased mechanical excitability of freshly regenerated fibers can usefully be applied to the diagnosis of nerve regeneration.

Studies in the Mechanics of Synovial Joints. I—Fundamental Principles and Diadochal Movements. M. A. MacConaill.

Irish J. M. Sci. **246**:190 (June) 1946.

A distinction is drawn between movements and displacements. The term "movement" refers to the path traversed by the extremity of the bone (or limb) considered, that is, the extremity farther from the joint. The word "disp'acement" is reserved for the displacement of an articular surface within the joint capsule.

Movements, it appears, can be divided into two groups: cardinal movements and circumductions. This classification appears to be exhaustive, for what is called "rotation" by anatomists and clinicians is merely a special case of circumduction. In considering a movement, one should take a line in the proximo-distal direction as the "axis" of the bone (or limb) in question. The distant end of this axis cuts an imaginery sphere which has its center on the axis and within the joint capsule (usually). This is called the "sphere of reference." It can be proved that this procedure is justifiable in the case of movements, whether it be true or not that the actual surface of reference is a true sphere; the proof involves an unfamiliar, though simple, type of projective geometry. It is to be noted, however, that the study of displacements within the joint cannot be simplified in the same way.

Fluorescence of Nails From Quinacrine Hydrochloride. Robert R. Kierland; Charles Sheard; Harold L. Mason, and Walter C. Lobitz.

J. A. M. A. **131**:809 (July) 1946.

The accidental finding of intense fluorescence of the toenails and fingernails of persons receiving quinacrine hydrochloride (atabrine) was first noted in December, 1945. Brilliant yellow-green fluorescence of the nails of persons receiving atabrine is exhibited under the Wood type of spectral filter, and atabrine in demonstrable amounts is present in the hair, nails and skin.

Statistics and Medicine.

J. A. M. A. **131**:828 (July 6) 1946.

Medical papers based on excellent studies often are presented without adequate analysis or interpretation of the statistical data. Especially important are difficulties of interpretation and errors of calculation in which the time factor is present. The data will be most informative only when analyzed according to units of time. Rates of recurrence following operation or survival rates after diagnosis has been made are meaningless unless related to the time factor. When the medical data require expert study in order to produce the most informative and reliable results of which they are capable, the assistance of a professionally trained student of medical statistics is often desirable.

Lumbo-Sacral Root Pain. J. MacD. Holmes.

Brit. M. J. **4459**:946 (June 22) 1946.

Most cases of sciatica will clear up spontaneously, or can be cured or relieved by relatively simple measures without resort to surgery. Rest in bed, splinting, physical therapy (particularly the application of heat), injection of "trigger points" with local analgesic and epidural injections of saline or local analgesic, all give successful results. There is also no doubt that a small number of cases are unaffected by such measures or suffer from recurrence of pain at intervals. It is not always satisfactory to temporize and attempt simple treatment in every case. The condition may be progressive, as in spinal tumor. Even in cases of disk protrusion a sudden increase in the protrusion may sometimes cause an irrecoverable paraplegia. It is, moreover, important to most patients that they should return to work and be free from disability as quickly as possible.

The authors have made a complete clinical and radiologic examination of all their patients with sciatica, including lumbar puncture with manometry and examination of the cerebrospinal fluid. If the presence of root irritation has been suggested, or if pain has been severe or of long duration, operation is considered. If operation seems necessary, and has been agreed to by the patient, myelography with iodized oil has been carried out.

The Problem of Reconditioning and Rehabilitation as Related to Cardiac Diseases. Robert H. Schoene.

Ohio State M. J. **42**:503 (May) 1946.

Among the most notable contributions the Medical Corps has made, has been its efforts in revising the older thoughts and trends towards convalescence and its institution of the reconditioning and rehabilitatoin of patients suffering from injury or disease, both mental and physical.

When compensation has been established, the job is not yet finished. The patient must be reconditioned and rehabilitated. Work commensurate with his cardiac reserve must be recommended. Industrial studies have clearly demonstrated that many cardiacs have been the most productive elements in various units, and industries in geneneral have done an about-face from the old days when they refused to employ a known cardiac in any status.

Rheumatic heart disease includes both myocarditis and endocarditis, complicating acute rheumatic fever. No one can deny that in proved cases of cardiac involvement in rheumatic fever, the treatment must be bed rest until the sedimentation rate, fever, leukocytosis, and joints have returned to normal. In proved cases during convalescence, many tests can be used to determine the cardiac efficiency, but the most recent one applied by the Army and Navy has been the two-step test or some modification of it.

Many factors must be taken into consideration in discussing the convalescence, rehabilitation and reconditioning of the cardiac patient with coron-

ary insufficiency. Among these are age, severity and location of the infarct, presence or absence of hypertension, mental attitude, previous job qualifications, general body health, and co-existing diseases.

Hyperpyrexia in Treatment of Ocular Conditions Due to Syphilis. H. C. Knight, and W. S. Schachat.

Arch. Ophth. **35**:271 (March) 1946.

The authors report 35 cases of syphilitic ocular conditions in which specific antisyphilitic chemotherapy, the usual local ophthalmic therapeutic measures and the Kettering hypertherm were employed. Improvement resulted in 4 of 19 cases of syphilitic atrophy of the optic nerve, clinical progression of symptoms was arrested in 7, and in 6 the disease either continued to progress despite, or had its onset during Kettering hypertherm treatment used in conjunction with other (standard) methods of therapy. Artificially induced fever therapy is valuable in the treatment of syphilitic choroiditis, particularly when the lesions are fresh. It was employed in 6 cases of the acute form and resulted in decided improvement in 4. In the other 2 cases old, quiescent lesions were present. The method is especially valuable when employed in the treatment of acute iritis associated with secondary syphilis and affords a rapid form of treatment of this condition. In 6 cases of this type excellent therapeutic results were obtained. The method is definitely beneficial in the treatment of syphilitic interstitial keratitis and is most helpful in alleviating the severe pain and photophobia which are often associated with this disease.

Poliomyelitis—Results of Treatment. C. J. Frankle, and Ruth L. Cralle.

Virginia M. Monthly **131**:869 (July 6) 1946.

Frankel and Cralle say that during the 1944 epidemic 58 cases of infantile paralysis were treated at the University of Virginia Hospital. At that time they concluded that the Kenny treatment, as a whole, was unnecessary, was expensive and required larger numbers of trained personnel than were then available. The orthopedic service had adhered rigidly to the Kenny method in 1943. All except 12 cases were brought to the hospital after a three weeks isolation period in selected centers throughout the state. Muscle check examinations were done soon after the patients entered the hospital. These were repeated monthly. Muscle spasm was seen in all cases. The patients were placed on beds with fracture and foot boards. Muscle spasm was treated with application of hot wet packs given four or five times a day and discontinued when pain on stretching disappeared. Neostigmine methylsulfate and atropine were given intramuscularly and neostigmine bromide orally. The authors conclude that hot packs and neostigmine are of value in the early treatment of poliomyelitis. Neostigmine is more effective when given intramuscularly. Incoordination is also lessened by the administration of neostigmine. Early locomotion with or without braces gives the patient a better outlook and speeds his rehabilitation. The end results so far as paralysis was concerned were no better than with previous methods of treatment but the patients did show less atrophy and less peripheral circulatory difficulty. Early physical therapy is of distinct value and should be instituted as soon as pain subsides.

Pulmonary Exchange During Artificial Respiration. R. R. Macintosh, and William W. Mushin.

Brit. M. J. **4458**:908 (June 15) 1946.

A clear airway was maintained throughout by a wide-bore endothacheal cuff-tube. The subjects were healthy young males, and the operator highly skilled. Eve claims that the venous return to the heart, and therefore the output from the heart, are improved more by his method than by others. The figures given record only pulmonary ventilation.

The authors believe that in artificial respiration too much stress has been laid on unimportant outward details and not enough on absolute essentials such as the maintenance of a clear airway. The choice of any particular method appears to be relatively unimportant. If the subject is dead no method will be availing, and, speaking broadly, if a spark of life still exists any method, properly carried out, will probably suffice.

Waters and Bennett recorded the figures of artificial respiration carried out under deep surgical anaesthesia, and the authors agree with their observation that "an apnoeic patient under deep anaesthesia simulates the candidate for resuscitation by artificial respiration."

Some Minor Medical Maladies of Old Age. Trevor H. Howell.

Practitioner **936**:444 (June) 1946.

For old people, the most beneficial line of treatment in fibrositis seems to be some form of heat combined with deep massage. Diathermy is not usually necessary, but infra-red rays, radiant heat, the radiations from a gas fire or an electric radiator, even a half-filled rubber hot-water bottle, may be used with benefit. It is important to have the affected site well and deeply massaged in order to break up the rheumatic nodules or corrugations. To forward this purpose, it was usual at the rheumatic clinic in the Royal Hospital to have compound ointment of mercury (Scott's dressing) massaged into the part while it was being heated under the lamp. This method gave good results, only 5 per cent of the patients not responding quickly. The most common form of backache in old people is sacroiliac strain, which often ensues after unusual exertion. It responds well to support with Elastoplast, applied from the front of the anterior superior iliac spine, round the back, to a similar spot on the other side of the body. Two shorter, overlapping parallel pieces below the first may be added with benefit; but all three must be drawn tight when applied, to give the best result. If this fails, short wave diathermy usually gives relief.

Another condition which is resistant to therapy is true neuritis, i. e., not secondary to fibrositis. The most suitable treatment in this disorder is rest, support and heat, to which some authorities add the use of the galvanic current. Massage is definitely contraindicated and the less the patient uses the affected part, the better.

A New Method of Treatment for Vaginitis and Cervicitis. Samuel L. Siegler.

Am. J. Obst. & Gynec. **52**:1 (July) 1946.

A new antivaginitis sulfathiazole polyethylene glycol acid jelly is described. The jelly is nonirritating, nonstaining and of agreeable odor. It spreads over the cervical and vaginal surfaces and is completely soluble in the secretions. It does not easily leak out of the vagina unless the discharge is profuse. It has a mild but definite astringent effect on the vaginal mucosa. Use of the jelly alone has given good results in the management of cervical infections in 22 per cent of the cases treated. The period of convalescence can be markedly shortened, and annoying symptoms reduced by using the jelly before and after such procedures as conization, coagulation, cautery, plastic repairs, and other intravaginal surgery. Healing was complete within an average time of five weeks with a minimum of sequelae.

Use of Curare in Oil in Treatment of Spasticity Following Injury of the Spinal Cord. Edward B. Schlesinger.

Arch. Neurol. & Psychiat **55**:530 (May) 1946.

A suspension of curare in a mixture of peanut oil and white wax afforded good relaxation of muscle spasm of up to three days' duration in a group of patients with injuries of the spinal cord. Effective reduction of spasticity was not accompanied in any case with the usual effects of curare, such as severe changes in accommodation and head drop. Slow absorption, with avoidance of unpleasant side effects, greatly enhances the therapeutic value of the drug. The use of curare in oil in relief of spasticity following injury to the cord seemed of therapeutic value in a series of 11 cases, of which 4 are cited in this paper. The value of drugs which afford relaxation of muscle spasm in permitting physical therapy is stressed. The effect of curare in oil on patients with some voluntary function masked by spasticity seemed more dramatic than the effect seen in paraplegic patients. The effect of curare in oil in treatment of syndromes exhibiting spasticity, tremor or rigidity will be further explored.

The Value of Electromyography in Lesions involving the Lower Motor Neurone. Ruth E. M. Bowden.

Proc. Roy. Soc. Med. **39**:339 (April) 1946.

It has been suggested that electromyography has outmoded investigation of electrical reactions of the affected muscles. The results of electrical reactions have been described as unreliable, but the methods used have often lacked uniformity and it is not, therefore, possible to evaluate them adequately.

Treatment is dependent on the type of lesion. Degenerative lesions require physical therapy even if operative intervention is not necessary.

In the light of present knowledge of peripheral nerve injuries, it does not seem possible to abandon any of the available diagnostic methods. The electromyogram is a useful aid to diagnosis, prognosis and treatment. If used in conjunction with information given by the history and full clinical examination, it is possible to make a fairly accurate and comprehensive diagnosis in the majority of cases; but there is still a small group in which the surgeon is faced with the problem, "Is it best to wait and see, or should one look and see without further delay?" Early exploration is indicated if there is any doubt about the ultimate progress of the patient.

Value of Tinel's Sign. P. W. Nathan, and A. M. Rennie.

Lancet **6400**:610 (April 27) 1946.

A tingling sensation referred distally, produced by tapping over the course of a nerve, has been thought to indicate the regeneration of that nerve. This phenomenon was first described fully by Tinel, who called it "le signe de fourmilliment." The sign was at first highly esteemed as proof of regeneration.

The state of Tinel's sign in peripheral nerve lesions is recorded in relation to regeneration and the state of the nerve found at operation.

An attempt is made to evaluate the sign; conclusions are tentatively drawn on the management of peripheral nerve lesions, making use of the sign. A negative sign has no value. A positive sign which is advancing or can be elicited well below the lesion contraindicates exploration.

Physical Therapy Management of Lower Extremity Amputees.

Bull. U. S. Army Med. Dept. **5**:623 (June) 1946.

At the suggestion of the orthopedic consultant, The Surgeon General's Office, representative medical officers and physical therapists from the Army's amputation centers met in September, 1945 at the Army Medical Center, Washington, D. C., to evaluate the existent method of treatment of lower extremity amputees and make recommendations for a standardized program.

The revised program is outlined in War Department Technical Manual 8-293, "The Physical Therapy Management of Lower Extremity Amputees," which has been forwarded to the Adjutant General for publication. With the publication of TM 8-293 on or about May 30, 1946, TB MED 122, dated December, 1944, is rescinded. The new directive is believed to be the most exhaustive study on lower extremity amputees accomplished in this country and will be of great value in the treatment of lower extremity amputees in civilian as well as military installations.

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Section on Physical Medicine

Municipal Auditorium, Bay Front Park **Miami, Florida**

Wednesday, November 6th, 2:00 p. m.

1. **Chairman's Address: The Care of the Paralyzed Shoulder Girdle.**
   ROBERT L. BENNETT, M.D., Professor of Physical Medicine, Emory University Medical School; Director of Physical Medicine, Warm Springs Foundation, Warm Springs, Ga.

2. **High Resistive Low Repetition Exercises.**
   GEORGE D. WILSON, M.D., Chief of Physical Medicine, Branch Office No. 4, Veterans Administration, Ashville, N. C.

3. **The Use of Physical Medicine and Rehabilitation in Internal Medicine.**
   B. C. BLAINE, M.D., Assistant Chief, Branch Office No. 5, Veterans Administration, Atlanta, Ga.

4. **Retarding Denervation Atrophy.**
   CLINTON KNOWLTON, Ph.D., Assistant Professor of Physical Medicine in Charge of Research, Emory University Medical School, Atlanta, Ga.

5. **Physical Medicine in the Care of Rheumatoid Arthritis.**
   HOWARD F. POLLEY, M.D., Section on Physical Medicine, Mayo Clinic, Rochester, Minn. (by invitation).

6. **Electrolysis.**
   HARRY M. ROBINSON, M.D., Professor of Dermatology, University Medical School, Baltimore, Md.

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MEETINGS OF INTEREST TO THOSE IN THE FIELD OF PHYSICAL MEDICINE

In these columns will be published information about meetings of interest to those in the field of physical medicine. New data should be sent promptly to the office of the Secretary, 2 E. 88th St., New York 28, N. Y.

New York Society of Physical Medicine; meetings on first Wednesday, from October to May, New York City; Dr. Madge C. L. McGuinness, 51 East 87th Street, New York 28, Secretary.

The Pennsylvania Academy of Physical Medicine; meetings at the Philadelphia County Medical Building, 21st and Spruce Streets. Dr. Harold Lefkoe, 601 Medical Arts Bldg., Philadelphia 2, Secretary.

Southern California Society of Physical Medicine, Secretary-Treasurer, Dr. Clarence Dail, 802 Acacia Street, San Gabriel, Calif.

Section on Physical Medicine, Southern Medical Association, Nov. 6, 2 p. m., Municipal Auditorium, Bay Front Park, Miami, Florida. E. J. C. Hildenbrand, M.D., Garfield Hospital, Washington 1, D. C.

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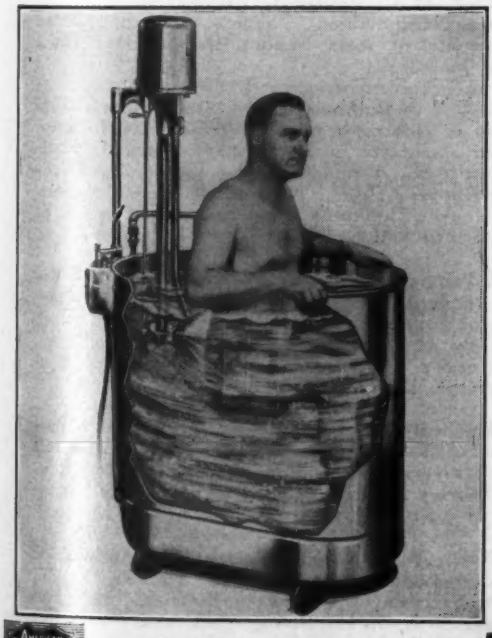

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